

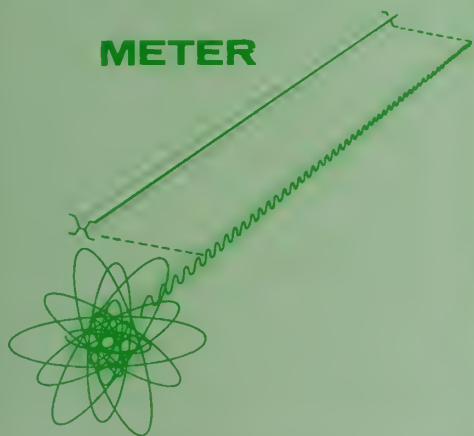
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# Defense Management Journal

DOD COST REDUCTION AND MANAGEMENT IMPROVEMENT PROGRAMS



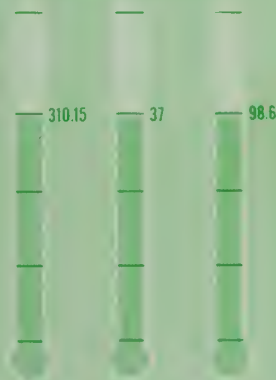
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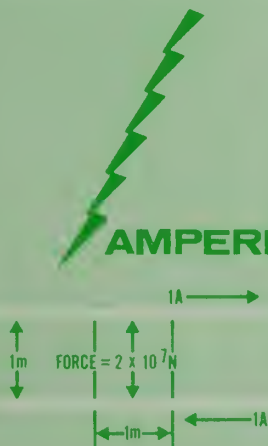
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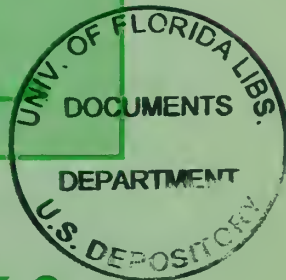
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*Cover photo—Conversion to Metric System? Defense to measure problems.*

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# Defense Management Journal

(formerly Cost Reduction Journal)

*Published by the Directorate for Cost Reduction and Management Improvement Policy, Office of the Assistant Secretary of Defense (Installations and Logistics).*

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# The Qualities of Good Management

The Defense Management Journal asked me what I expected of Defense managers. "Their very best performance" seems a simple enough answer but—like all generalities—hardly a satisfying one. For our "best" is a function not only of *what* we do as managers but also of *how* we go about getting it done.

The way we manage hinges on our capabilities, and these differ in the degree to which each of us cultivates the qualities of good management. I have some firm convictions on that score that I would like to share with you.

First, a good manager has a keen appreciation of his organization's objective and his own role in achieving it. To me—and, I am sure, to everyone in the Department of Defense—no objective is more inspiring than giving form and substance to the might that insures our freedoms. Yet, because we are human, the crush of day-to-day problems and the sheer immensity of the organization we work in may blur our perception of the vital role each of us serves in the overall scheme. The manager's responsibility is intelligent guidance—as distinguished from perfunctory, reactive performance—in making his function meaningful to the organization's mission. Only an appreciation of the relevancy of his role can provide the managerial sense of direction so necessary for creating and channeling initiative.

Second, the good manager has an unshakeable code of ethics. By this I mean a commitment to fair dealing and a concomitant sensitivity for people. If he has these attributes, he will involve himself with others in constructive effort—not only on his job but in his community and in the broader social problems of our time. High objectives are likely to be achieved only when all of the people in the organization join in a common commitment and dedication to a high ethical standard in the performance of their job.

Third, the good manager creates an environment that stimulates progress. That kind of environment begins with management attitudes. Many factors are involved: the personal touch, that is, how much he gives of himself to encourage the wellsprings of talent within his organization; his enthusiasm for improving his operation; his receptiveness to new ideas; his emphasis on teamwork; his impartiality in recognizing—by promotion, commendation, or otherwise—the efforts of those on whom he depends for results. He will also have spirit enough to set challenging goals for his organization and courage enough to welcome appraisals of his progress toward those goals.

Fourth, the good manager is a strong-minded individual. Call it drive or leadership or even charisma. None precisely hits it on the head because it is an easier trait to observe than it is to describe. But it is the stuff that causes the people around a manager to rise above routine or average performance—to give more of themselves than they knew they had. It is an ability to get the job done—by design if possible, by improvisation if necessary. Getting the job done is the objective, not just living by the book. Some years ago I referred to this trait as "the mainspring of management" and said that it made the difference between the great manager and the mediocre one.

Managers in the Department of Defense have one motivation going for them that managers elsewhere do not. They are directly committed to a cause that supports the very foundations of government—the preservation of government itself. Military power makes it possible for peaceful diplomacy to operate from positions of strength; it enables our Nation to arrive at just decisions free from threatening influence; it enables us to live—fully live—as free people with a free conscience. Thus, the nature of this Department's commitment imposes on all of its managers the challenge to seek and obtain the highest standard of performance from every person in their organization—in every area of their responsibility.

DAVID R. PACKARD,  
*Deputy Secretary of Defense*





## *Foreword*

President Nixon has always been concerned about overlapping Federal activities and the complexity of governmental procedures, particularly with respect to programs designed to assist State and local communities.

Even before he moved into the White House, the President asked me to do something about it.

As the first step, I persuaded Dwight Ink, an able administrator with a distinguished record of government service, to come to the Bureau of the Budget as my Assistant Director in charge of the new Office of Executive Management. I know of no one in or out of government with better credentials to undertake the awesome task of improving management in a bureaucracy that employs almost 3 million men and women and spends more than 190 billion dollars a year.

The President expressed gratification at my selection of Mr. Ink as an important step toward achievement of his objectives. He subsequently created the President's Advisory Council on Executive Organization to undertake a thorough review of the organization of the Executive Branch, with the Budget Bureau providing staff assistance.

In Government, as in private enterprise, we are in a period of change unparalleled in history. We have gone through two decades of innovation and use of national income to bring about change that cannot be matched by any other nation or any other era. Yet we have yawning chasms of unfulfilled need, of frustrated hopes, of ugliness in a period of beauty and plenty. The greatest potential for fulfilling some of our frustrated expectations and bridging some of the chasms is management. Management is the process which makes reality of dreams, bridges out of plans and materials.

The Bureau of the Budget will strive to do its part.

ROBERT P. MAYO,  
*Director, Bureau of the Budget*

# AGENDA FOR BETTER GOVERNMENT MANAGEMENT

*"Administration, at all levels, must be directed toward making programs work better and more economically, and not toward strengthening competing power blocs in bureaucratic struggles."*

**T**O ACHIEVE anything of significance in government, business, or any large scale enterprise, it is often said that three ingredients are required:

- Ideas
- Resources
- Management

Regardless of how brilliant the original concept or how many resources are poured into an enterprise, nothing is achieved without effective management. The road connecting ideas with results is long and tortuous. To travel this road successfully in today's complex world requires a degree of skill far beyond that which was adequate 20 years ago.

We have no dearth of ideas about how to improve the quality of American life or to preserve our national security. Funding has been more of a problem. But while we may complain because there have been in-

adequate funds for important purposes, funding problems cannot be permitted to obscure deficiencies in management, particularly in the newer, more innovative programs where there has often been less emphasis on management.

President Nixon has stressed the critical importance in his Administration of improving management and organization. He is looking to the Bureau of the Budget through the new Office of Executive Management to join with the departments and agencies in improving departmental management, in improving the machinery for cooperative effort among Federal agencies, in improving the mechanisms for cooperative effort among levels of government and in providing better organization in both Washington and the field.

## OPPORTUNITIES TO IMPROVE GOVERNMENT MANAGEMENT

An enterprise as large and far-flung as the Federal Government must be operated on a decentralized basis. Each cabinet officer must run his own department within the framework of Presidential policy. But he must run it well. Managers under him also should be free to direct their programs without detailed second guessing on technical matters. However, before these objectives can be achieved many departments and agencies must first improve their general management,

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**By DWIGHT A. INK**

***Assistant Director for Executive Management  
Bureau of the Budget***

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simplify administrative processes, and strengthen their field installations. The problems of our society are so complex, and our national programs to attack them are so interrelated, that the realization of most objectives depends on cooperative effort both among elements of the Federal Government and, often, with State and local governments and other public and private institutions. Administration, at all levels, must be directed toward making programs work better and more economically, and not toward strengthening competing power blocs in bureaucratic struggles.

At this stage I can only present the general outline of our thinking in the Office of Executive Management since we are still in the planning phase. But we know we have a challenging agenda for the joint efforts of the Bureau of the Budget and the departments and agencies.

### **1. Improve Executive Branch Organization.**

Managerial technicians often place undue reliance on structural reorganizations to remedy operational or coordinative deficiencies. Members of Congress and the general public sometimes assume organizational changes can resolve any complex coordinative problem. Even program managers may see reorganization as the simple solution to their managerial headaches—but only if all activities remotely related to their present responsibilities are placed under their supervision.

Reorganization is often necessary to adapt the structure to new programs and changing emphases. At times it is needed critically. But its curative powers should be weighed against its side effects in terms of employee morale, breaks in operational continuity, and the possible creation of more serious coordinative problems than it solves. Organizational decisions are inherently decisions as to which sets of problems it is easiest to live with. Reorganization is not a cure-all for management ills. It is only one of the medicines available to us and it should be prescribed only when prognosis is for a significant pay-off.

Despite these cautions, it is clear that a careful review should be made of the present organization of the executive branch to assure its suitability to carry out Federal programs. The President asked Congress to give him the authority his recent predecessors have had to reorganize the executive branch—and Congress has responded by extending the Reorganization Act. The Bureau will play an important part in the development of reorganization plans to be submitted under that authority, as it has in the past.

### **2. Improve Departmental Management**

A particular area of concern to the President is the quality of departmental management. To reach the national goals of the Federal Government requires the successful implementation of many hundreds of difficult nationwide and international programs entrusted to the departments and agencies. The success of these pro-

grams depends in great part on the skill with which they are managed.

The Bureau's role in improving departmental management will be primarily that of helping departments strengthen their own capability to deal with these problems. We will be concerned with increasing the vitality of departmental administrative activities such as auditing, accounting, budgeting and organizational and management improvement. The Bureau, within the resources available, will also participate in a few carefully selected management studies and improvement efforts, particularly those having interagency or inter-governmental aspects or where the expected payoff is great.

As more and more Federal programs have involved departments and agencies in relations with State and local governments and educational institutions, it has become apparent that we are wasting scarce management resources by having each agency do on a fragmented basis what could be done better together. An example of this is auditing of Federal funds. A policy of naming cognizant audit agencies for educational institutions is now being implemented—an extension of a practice started within the Defense Department. At the same time, we need to develop arrangements under which audits performed by or for the grantees will increasingly cover Federal requirements. In this way Federal agencies will utilize the audit work of the grantees to the maximum extent possible, avoiding duplication of effort between Federal and grantee auditors.

Today's most pressing need for improved management in the Federal Government is in the area of the social action programs, especially where they relate to and may be expected to help relieve the "urban crisis." While we will concentrate for the short run on the newer programs, many of the lessons we learn and the solutions we arrive at will have application to other program areas.

The urban crisis is national in scope. The same social and economic and physical problems plague city after city across the nation. A broad range of Federal programs has been designed to help the cities cope with these problems. Unfortunately, these programs have been highly fragmented, often underfunded, and frequently bogged down with complex administrative requirements.

Management must be an integral part of the planning for and execution of new programs. Before projects can be approved under newly enacted legislation, headquarters and field organization responsibilities need to be pinpointed and program standards and specific goals established. Basic schedules and progress reporting against them need to be established. Program and administrative budgets need to be prepared; and financial systems including accounting, auditing, and reporting need to be developed. Staffing levels and staffing patterns have to be developed.



I have been especially disturbed at the reluctance to draw upon experienced management talent to direct many new Federal programs. To expect a person with no experience in directing large numbers of people or dollars to run a major program covering several hundred million dollars each year is much like asking a social worker without engineering experience to build a safe bridge over which thousands of cars and trucks travel each day.

### **3. Improve Field Organization and Management**

The strengthening of field office management is essential if program administration is to be brought closer to the people. This will require improvements in organizational structure and decentralization of responsibility for action. Here, again, we must concentrate our efforts where the greatest need exists—for now, in the human resource or social action area. From this beginning we hope to gain experience and insight that will help us improve management and organization in other program areas.

During my years in Washington I have been baffled by the widespread illusion that Washington can run programs more efficiently than people near the scene of action. The military departments learned long ago that a field commander must make operational decisions in the field—he cannot be hamstrung by having to get approval from Washington for almost every move. Washington simply cannot handle the complex administrative details of most civilian programs either. In the urban area, for example, each community is different, each has its own personality, its own economic problems, its own brand of local leadership. Local needs are dynamic and ever-changing. The legislative objectives of such programs can be met intelligently only by people who are close enough to know what is going on and who can respond quickly to sudden local developments.

There needs to be a clear delineation of roles between the headquarters and field levels. The appropriate sphere for headquarters is policy making, planning, standard setting, evaluation, and legislative planning and support. The proper role for field elements is facilitative guidance to State and local governments and administration of programs near the problems they are designed to solve.

If the field is to be strengthened, what steps should be taken? One excellent place to begin is to eliminate the geographic confusion among human resource agencies. The Model Cities planning effort has been handicapped by the fact that HEW, HUD, Labor, OEO, and SBA all had different regional boundaries. No two have the same set of regional offices. Yet the basic objective of this innovative program is to draw upon a broad range of Federal activities cutting across departmental jurisdictions. The President has taken action to establish common regional boundaries and regional office

locations for these five departments and agencies. A consistent regional structure will make it easier for the program to respond on a coordinated basis to the comprehensive physical, social, and economic planning of a community. When the Federal field establishment is disjointed, it becomes difficult for local officials to pull together in a common effort to solve community problems.

Another important step would be to draw together related departmental units or programs within a department under a regional director, who is given authority to supervise the totality of programs. This situation now exists in relatively few departments and agencies. Fragmentation of program implementation in the field contributes to confusion among field staff and with the States and cities, difficulty in pinpointing responsibility for results, and, in general, a poor Federal image.

Field managers need, also, to have the management resources with which to direct their programs: authority to select and train their employees, authority to manage their funds, and to provide other resources where they are needed.

If the Federal field establishment is to have heavier responsibilities, headquarters must do its part, too, by establishing policies and standards—in short, telling the field how it wants the programs administered. Then, it must evaluate field performance and program impact so both the programs and administration can be made responsive to objectives and needs.

### **4. Foster Intergovernmental Cooperation.**

Achievement in many of the most critical areas in which the Government operates depends on the cooperative action of agencies, institutions, and forces other than those of the Federal Government. Most of what we are trying to accomplish in the urban field, for example, requires the active participation of several Federal agencies, of State and local governments, and of private institutions. In other problem areas we need the cooperation of business and of multilateral international organizations as well. We need to develop the concept of partnership in the achievement of national purposes.

Most of the programs in the human resources field involve the cooperative activity of more than one Federal agency as well as of State and local agencies. Means must be found to achieve this needed cooperation in a meaningful and fruitful way. Where all pertinent programs cannot be brought under the umbrella of a single department or agency, the further development of the use of a lead agency should be considered. One example of the lead agency role is the joint funding of projects at the local level of two or more agencies, as is authorized by the Juvenile Delinquency Prevention and Control Act of 1968 and the Economic Opportunity Act of 1964, as amended.

*(Continued on p. 62, AGENDA)*

# CULTS, “ILITIES” AND

**T**HAT OLD CURMUDGEON, Jonathan Swift, centuries ago made the unlikely observation that fleas and poets have something in common. You may recall these oft quoted lines:

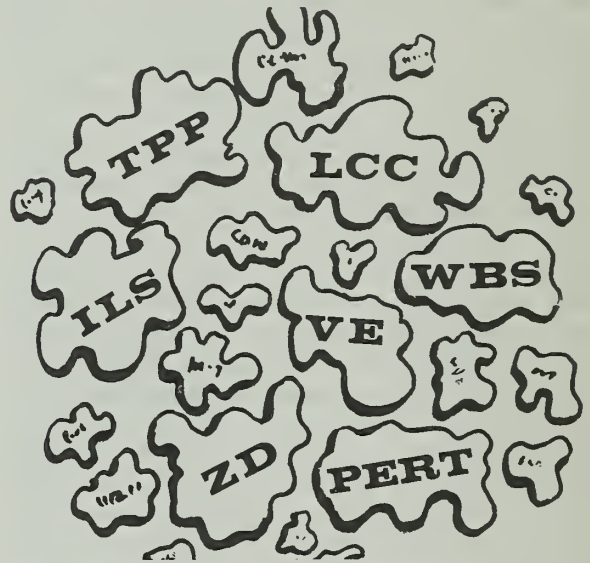
“So, naturalists observe, a flea  
Hath smaller fleas that on him prey;  
And these have smaller still to bite ’em;  
And so proceed ad infinitum.  
Thus every poet, in his kind,  
Is bit by him that comes behind.”

It is not at all improbable that these lines, or their equivalent, echo and re-echo through the executive suites and drafting rooms of project and executive managers. But while the aforementioned fleas fall into a neat pattern of smaller ones preying on larger ones, the cults, “ilities” and systems that confound project managers do not interface so tidily. Given a fine tweezer it is probably easier to disentangle fleas from one another than to distinguish major management engineering ideas, mandates, and movements from those that are relatively minor. Even management/engineering specialists whose business it is to keep abreast of the literature are hard pressed to discern a clear hierarchical or other pattern among the plethora of objectives, concepts, programs, systems, plans, and techniques that compete with each other for managerial favor.

## Response to Need

This fertility of ideas should not, however, be interpreted as evidence that management “intellectuals” have time heavy on their hands and have taken to the typewriter and podium for lack of something more use-

“Could you,” *The Defense Management Journal* asked, “assemble this alphabetical hodgepodge?”



“Perhaps,” said the author, “but please advertise this venture as personal catharsis lest managerial theologians deem it heretical.”

ful to do. On the contrary most specialized activities come into existence, at a particular time, as useful responses to real needs. Quality control had its roots back in the midtwenties when it was recognized that it is practical to make statistically valid distinctions between manufacturing processes that are in control versus those out of control. Thus the stage was set for a somewhat frenzied movement in the early forties called “statistical quality control.” Despite some extravagances, statistical quality control served and continues to serve a useful purpose. But it is only a tool. It is not the answer to a manager’s prayer for good quality.

As aerospace technology and electronics leaped ahead during the past two decades specific product performance characteristics became the focus of intensive attention. Thus certain “ilities” emerged—particularly “reliability” and “maintainability.” Not unlike statis-

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By **JOHN J. RIORDAN**

*Director for Technical Data,  
Standardization Policy and  
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# SYSTEMS MANAGEMENT

tical quality control the “ilities” were loudly trumpeted and important benefits were realized, including new techniques for defining reliability and maintainability requirements. These, in turn, constituted an essential base for subsequent developments in incentive contracting and systems engineering. Value Engineering surfaced as a reaction to gold-plating. More recently “Configuration Control” and “Zero Defects” are reactions to demands for more accurate documentation of engineering and other changes and for improved product quality.

## **Cultism and Managerial Oversight**

While it is true that cascading developments in management and technology reflect fresh thinking and new accommodations, it is also true that certain techniques and ideas tend to be overly emphasized to the point of deification. It soon becomes difficult to distinguish “big things” from “little things,” ends from means, or gimmickery and public relations from engineering and management essentials. When a particular technique, idea, or limited objective is overly accentuated certain cults begin to emerge. Cults are assemblages of well intended enthusiasts who strongly—sometimes fanatically—identify with particular specialties. These specialties may be “ility” (i.e., reliability) or a movement (zero defects), or a managerial subculture such as systems engineering. To the extent that these cults both arise and persist they are symptoms of managerial oversight. Management simply failed to anticipate, confront, or resolve new and sticky problems. There is nothing wrong with cultism except that too often cults refuse to go away once their purposes have been served.

## **Background**

It is quite obvious that various cults, “ilities,” and movements represent something more than responses to isolated and particularized needs. They really represent the accommodation of industry and government to the mandates of a democratic society and of a competitive economy. Understandably, therefore, there is a continuing need for improving or adjusting the interface

between industry and government so that each fully respects the rights and responsibilities of the other. In a practical sense this means that government must explain in clear technical language what it expects of the products it acquires from industry. When hardware is highly complex and performance requirements border on the exotic such explication becomes a gruelling and a technically difficult task. It is the task of specifying requirements. Without clear and complete specifications competition is crippled. Equally important, the government is obligated to make sure that it acquires hardware at minimum cost consonant with quality. In the past the word “cost” has been largely interpreted to mean the cost of one-time acquisition. Today the word “cost” is increasingly inclusive of the cost of ownership. Analogously it might be said that the cost of operating and maintaining an automobile is no less important than the figure stated on the showroom price tag. This concern with the cost of ownership is one of the truly significant economic developments of recent years and explains the genesis of many ideas and concepts that are associated with the “new management” in both government and industry.

## **Trend Toward Synthesis**

There is reason to believe that the era of proliferating “ilities,” cults, and movements is giving way to an era of synthesis. Both in government and industry attempts are being made to integrate related disciplines and techniques so that they complement rather than compete with each other. Synthesis, however, is not so much a destination as a journey. It is neither likely nor desirable that there should be a final synthesis. That would be the equivalent of stopping the wheels of progress. But obviously there is need for “drawing in lines” and thus make possible the more effective utilization of diverse resources, intellectual, physical, and financial. There is no single and preemptive perspective by which one can conceptually integrate a mish-mash of activities that have had their roots in widely separated times, places, and circumstances. However, it might be useful to categorize, in a hierarchical order, some of the

“ilities,” techniques, and systems that are more or less of recent vintage.

### **Categorization**

Among subjects of particular prominence are systems engineering, integrated logistics support, work breakdown structure (WBS), PERT/Cost, configuration control, technical data management, value engineering, reliability, maintainability, life cycle costing, total package procurement, and quality assurance. It might be helpful to stratify these various subjects into categories by which like things are grouped with like things. The pattern of such categorization is less important than the act of categorization. By merely categorizing subjects it becomes easier to confront them logically and attempt to relate them intelligently to each other. No particular scheme of categorization has more merit than another except to the degree it reflects consistent and orderly thinking. It is suggested, therefore, that we might classify the subjects previously mentioned into five categories: (1) General Management Disciplines, (2) Particular Management Disciplines, (3) Procurement and Costing Techniques, (4) Identification of Performance Requirement, and (5) Results Assessment.

There is no doubt that a more apt and evocative categorization could be worked out. Nonetheless under this arrangement we can think hierarchically. Systems engineering can be viewed as a general management discipline. When systems engineering is applied to resolving problems associated with logistics it becomes “Integrated Logistics Support.” On a lesser hierarchical stratum we can group PERT/Cost, work breakdown structure (WBS), technical data management, configuration control, and value engineering. These are largely technical activities. To the extent that procurement can be considered nontechnical—oriented toward business and finance—we can locate life cycle costing and total package procurement on a separate stratum. Likewise we can think of reliability and maintainability as essentially product performance requirements deserv- ing of their own stratum. (Parenthetically it is to be noted that maintainability and reliability are basically probabilistic concepts. Until quite recently procurement largely involved discrete quantities of items that could literally be counted. Procurement now involves not merely “things” but degrees of probability that certain events, favorable or unfavorable, will or will not occur.) Lastly we can consider methods and programs for assessing results. This category properly includes quality assurance and possibly other activities such as after-the-fact cost/effectiveness analysis.

### **Systems Engineering as a General Discipline**

A general management discipline is a body of knowledge and techniques that can be applied under a wide

variety of circumstances for solving certain problems. Systems engineering might be considered a general discipline in the sense that it is potentially usable for many purposes. It is “general” in somewhat the same sense that thermodynamics constitutes a body of general principles. These principles find application for many varied purposes. Likewise systems engineering can be applied diversely, for example, to social as well as technical problems. There are, however, few technical terms that so stubbornly defy definition as “systems engineering.” Essentially systems engineering might be thought of as the integrated application of selected skills, knowledge and resources for the solution of complex and difficult problems. While this definition is hardly adequate it does suggest that systems engineering is an umbrella discipline encompassing various other subdisciplines and technologies. Systems engineering attempts to resolve defined problems and achieve defined objectives within clearly specified boundaries. Without clear objectives and boundaries, systems engineering becomes unwieldy, visionary, and self-defeating. Obviously the systems engineering discipline must be planned and shaped in the light of established objectives. To the degree that certain objectives (e.g., economic hardware acquisition and support) involve certain common problems, it is possible to standardize the events and their sequence that collectively constitute a systems engineering effort. In both government and industry there are strong efforts underway to achieve such standardization.

### **Integrated Logistics Support (ILS)**

In broad perspective—from an academic point of view—Integrated Logistics Support (ILS) can be viewed as a particular application of systems engineering theory and technique. The objective of ILS is to maximize the availability of certain hardware and to optimize the cost associated with its support. In a more limited context—within the perspective of a single government organization—we can think of ILS as a subsystem of a larger systems engineering structure that encompasses design, production, and logistics. Possibly it is not visionary to expect that a broad spectrum standardized engineering system will be developed that will encompass numerous subsidiary functions ranging from concept formulation to product obsolescence. There are definite trends in this direction. In the meantime it can be said that ILS is an effective discipline for integrating diverse functions and for making visible those things that must be accomplished upstream to restrain downstream support costs.

### **Particular Management Disciplines**

In considering these various disciplines it is important at the very outset to keep in mind that few if any can be considered “new inventions.” On the con-



trary these disciplines are largely refinements of techniques that have been used over the years but have not been clearly and precisely described, defined, and documented. One discipline that is the focus of strong attention—in both government and industry—is work breakdown structure (WBS). This phrase applies to the techniques by which the elements of a job, project, or system are identified and made clearly visible. The Department of Defense has defined WBS as “a product-oriented family tree, composed of hardware, software, services and other work tasks, which results from project engineering effort during the development and production of a defense materiel item, and which completely defines the project/program. A WBS displays and defines the product(s) to be developed or produced and relates the elements of work to be accomplished to each other and to the end product.” The really important and interesting development in WBS is the trend toward standardization of discipline itself. By reducing the variety of work breakdown structures important benefits can be realized. The most significant benefit is the facilitation of communications across organizational and functional lines. This, in turn, makes possible the uniform display, comparison, and costing of similar work units. It is interesting to note that the WBS discipline has a strong kinship to other techniques, particularly PERT/Cost. The latter, however, can be considered to complement WBS in the sense that it is a technique for planning and costing, on a one-time basis, complex jobs within discrete segments of the total work breakdown structure.

What, then, is configuration control? How does this relate to work breakdown structures and to the more traditional engineering disciplines? Stripped to essentials, configuration control is a process by which management keeps accurate track of change. In the parlance of the race track, configuration control might be thought of as “keeping book.” Configuration control reflects a philosophy that change is a way of life, and is not something to be praised or deplored. It is something to be managed. Configuration control is a necessary condition for orderly technological growth and for restraining cost. The antithesis of configuration control is configuration anarchy—mild or otherwise. Configuration control addresses itself to making sure that the characteristics of a system—its dimensions, properties, and performance—are fully documented and visible. It might be thought of as the “discipline of identity” because it serves to assure that we know precisely what a thing really is.

Where, then, does technical data management fit into this picture? It need hardly be said that various kinds of documentation are needed for procurement, maintenance, and many other purposes. That field of specialized management known as “technical data management” serves to identify technical data that is really needed. For example the government vitally needs cer-

tain data, developed by contractors, for use in competitive or follow-on procurement. Increasingly technical data is being managed quite similarly to hardware. In a sense technical data is a “commodity”—an expensive commodity. The techniques of technical data management are aimed at identifying data requirements, costing them, and effecting arrangements by which data that is needed is properly packaged, transferred, and stored for subsequent retrieval and use. Once a requirement for technical documentation is identified, the implementation of this requirement can be incorporated into the work breakdown structure.

Technical documentation—like hardware and services—might be advantageously subjected to systematic analysis to eliminate what is not essential to its purpose. Such analysis is more conventionally applied to the design and production of hardware and constitutes the discipline of value engineering (VE). A particularly attractive feature of value engineering is the willingness of the Department of Defense to share authenticated value engineering savings with industry. Theoretically, if design, production, documentation, and other functions were originally executed with near perfection, value engineering itself would be a superfluous function. This, however, is expecting too much of the human animal.

### **Procurement and Costing Techniques**

Procurement specialists frequently use two terms that relate to the topics already discussed. These are “life cycle costing” and “total package procurement.” These terms and the ideas they represent can easily be confused with others such as “total logistics support.” Life cycle costing and total package procurement have meanings that are not in conflict with terminology and functions related to engineering management. Life cycle costing is a technique by which the purchase costs of hardware are assessed not only with respect to initial acquisition costs—the cost at the factory door—but also with respect to costs of operating, storing, supporting, and maintaining hardware. In a certain sense life cycle costing incorporates cost of ownership philosophy into the procurement process. It also serves to convert total logistic support requirements into dollars. What then, is total package procurement? As the phrase implies this relates to the same genre of ideas as total logistics support and life cycle costing and is not easily distinguishable from the later. But possibly the words “costing” and “package” are the keys to distinguishing one from the other. Life cycle costing attempts to put a price tag on hardware in the light of ownership costs. Total package procurement has the same objectives. But it focuses on the design of the contract package *per se* for the purpose of assuring at the very outset of the acquisition process that the contract incorporates all necessary provisions pertaining to price, design, devel-



opment, production, performance, schedules, and support. Admittedly the distinction between these terms is a very fine one. Possibly the phrase "total package procurement" can best be thought of as the contractual device by which life cycle costing theory is reduced to practice—given teeth, so to speak. This would help to clear the air. Both pertain to the procurement and contracting process as distinct from planning and control disciplines previously discussed.

## Results Assessment

The disciplines and procedures for evaluating the results of developmental and production programs are derived from many fields of technology and management. There is one discipline—quality and reliability assurance—whose function and interface with configuration control, might usefully be explored. The phrase "quality assurance" pertains to the total spectrum of techniques by which the government (or industrial buyers and consumers) determines whether a contractor—a supplier—has fulfilled his contractual obligations as they relate to product quality and reliability. Contractors for the Department of Defense are responsible not only for controlling the quality and reliability of their products but also for providing verifiable substantiation that such controls have, in fact, been exercised.

Understandably then it becomes necessary to establish formalized procedures to determine whether contractors are satisfying their contractual obligations. This is the function of quality assurance. Without splitting hairs, quality assurance can be differentiated from "quality control" by the fact that quality control pertains to the firsthand control of manufacturing and other processes by producers while quality assurance

relates to the surveillance of producers by buyers and consumers. Both quality control and quality assurance use more or less identical tools in accomplishing their objectives. The quality disciplines interface importantly with configuration control. Neither quality control nor quality assurance can be effective in the absence of meaningful configuration control. It might be said that "bad configuration control leads to bad data which generates bad products." Quality and configuration disciplines usually intersect at the point where a product is measured against drawings and other requirements to determine its acceptability. If the configuration control discipline is weak and data is not accurate or current, deficient products will escape through the quality screen. The consequences can be costly and far reaching.

## Verbum Sap

Like the fleas and poets cited by Swift, it might be said that latter-day management thinkers and medieval philosophers also have something in common. They share a proclivity for fuzzy words and phrases and for interminable controversy. Instead of syllogisms, the weapons of modern technical controversy are concepts, systems, structures, elements, and networks—all wrapped in confounding mystique. This essay is a modest attempt to penetrate that mystique and to rationalize the relationship of WBS, ILS, VE, etc., etc. Possibly this effort has only served to compound confusion. If so, *mea culpa*. But to him who would ungratefully reject proffered distinctions between the likes of "total package procurement" and "life cycle costing" or "systems engineering" and "total logistics support", to him—"anathema sit." □

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### DOD Quality and Reliability Assurance Publications Issued by Office of the Assistant Secretary of Defense (I&L)

#### DOD Handbooks

- H-50: Evaluation of a Contractor's Quality Program, 23 Apr 1965; 30 cents.
- H-51: Evaluation of a Contractor's Inspection System, 3 Jan 1967; 25 cents.
- H-52: Evaluation of a Contractor's Calibration System, 7 Jul 1964; 20 cents.
- H-53: Guide for Sampling Inspection, 30 Jun 1965; 35 cents.
- H-54: Electromagnetic Testing, 15 Oct 1965; \$1.25.
- H-55: Radiography, 1 Apr 1966; \$1.25.
- H-106: Multi-Level Continuous Sampling Procedures and Tables for Inspection by Attributes, 31 Oct 1958; 60 cents.
- H-107: Single-Level Continuous Sampling Procedures and Tables for Inspection by Attributes, 30 Apr 1959; 55 cents.
- H-108: Sampling Procedures and Tables for Life and Reliability Testing, 29 Apr 1960; 50 cents.
- H-109: Statistical Procedures for Determining Validity of Suppliers' Attributes Inspection, 6 May 1960; 30 cents.
- 4155.12-H: A Guide to Zero Defects, 1 Nov 1965; 20 cents.

#### DOD Technical Reports

- TR-1: Mathematical and Statistical Principles Underlying MIL-STD-414, 15 Oct. 1958; 25 cents.
- TR-2: Tests for the Validity of the Assumption that the Underlying Distribution of Life is Exponential, 30 Nov. 1960; 35 cents.

- TR-3: Sampling Procedures and Tables for Life and Reliability Testing Based on the Weibull Dist. (Mean Life Criterion), 30 Sept. 1961; 40 cents.
- TR-4: Sampling Procedures and Tables for Life and Reliability Testing Based on the Weibull Dist. (Hazard Rate Criterion), 28 Feb 1962; 50 cents.
- TR-6: Sampling Procedures and Tables for Life and Reliability Testing Based on the Weibull Dist. (Reliable Life Criterion), 15 Feb 1963; 45 cents.
- TR-7: Factors and Procedures for Applying MIL-STD-105D Sampling Plans to Life and Reliability Testing, 21 May 1965; 30 cents.
- TR-8: A Guide to Quality Cost Analysis, 31 May 1967; Not for sale.
- TR-9: Zero Defects—The Quest for Quality; 15 Nov. 1968; \$2.00.

Order Handbooks, and Technical Reports from:  
The Superintendent of Documents,  
U.S. Government Printing Office,  
Washington, D.C. 20401.



*"The work of recording internal revenue collections has been considerably lessened by the use of a loose leaf register and an adding machine."*—

Excerpt from FY 1911 Cost Reduction Report,  
Treasury Department

## MANAGEMENT IMPROVEMENT—in the *Department of the Treasury 1910–68*

I AM PLEASED to have an opportunity to review the Department of the Treasury's Management Improvement Program in the *Defense Management Journal* because this permits a form of recognition for the many people throughout the Department who have contributed to the Program's success.

The object of Treasury's Management Improvement Program is the same as that of anyone else—to reduce costs and provide better services by improving the organization, staffing, general management, systems, and methods of the Department. In addition, by virtue of Treasury's position in the management of the fiscal

affairs of the Government, we are constantly seeking ways to increase or expedite the receipts of revenues due the Government as prescribed by Congress, and to reduce the costs of financing Government operations.

Our improvement efforts are extended throughout an organization consisting of 10 operating bureaus and the Office of the Secretary, and are applied to a wide

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**By A. E. WEATHERBEE**  
*Assistant Secretary for Administration  
Department of the Treasury*

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variety of functions. The Treasury Department mints coins and medals, accounts for receipts and expenditures of public money, administers the national banks, manages the public debt, promotes sales of U.S. savings bonds, collects the internal revenue, collects customs, protects the President and the Vice President and their families, and engraves and prints currency. The Treasury also enforces the laws pertaining to these functions. The Secretary, assisted by his staff assistants and offices, in addition to supervising the performance of the operating functions of the bureaus identified above, serves as the chief Government adviser to the President on fiscal affairs, has tax, monetary, and debt management policy-determining responsibilities, and is generally involved in international financial and monetary affairs.

### SIX DECADES OF IMPROVEMENTS

Management improvement, and its attendant cost reduction, is not new to the Department of the Treasury. It was not new in 1965 when the Bureau of the Budget promulgated its Circular No. A-44 (Revised), establishing the program throughout the Federal Government. It was not new in 1961 when the McNamara regime hit the Pentagon. And it was not new to Treasury in 1949 when Executive Order 10072 was issued. It was already a way of life in Treasury in 1947 when the Department formally established its internal program based on its historical operating philosophy of frugality. In fact, Treasury files include a 62-page, legal-size report that was prepared in 1911 by the Treasury

Department Committee on Economy and Efficiency—words which are thoroughly familiar to all of us in Government and industry who concern ourselves with today's search for improvements.

### 1910-1911—Hay Burners, Coal Burners and Cuspidors

According to the 1911 "Statement of Activities and Economies Effectuated in the Treasury Department," the "present annual rate of saving" at that time was \$2,113,942. For fiscal year 1968, Secretary Fowler reported to the President that the Department of the Treasury had realized annual benefits valued at \$97 million.

Some of the individual projects and accomplishments reported in 1911 are startling in their simplicity when compared to today's complex operations:

- "The delivery of milk by dairymen has been regulated, and permits are issued only after scientific tests of the products are made."
- "A steam room for use in cleaning cuspidors has been equipped."
- "Substitution of electric motor truck for the transportation of securities, paper, etc., between the Treasury Department and the Bureau of Engraving and Printing, instead of a horsedrawn vehicle."

Other items in this 1911 report are indicative of management concepts which we tend to think of as creations of our generation of managers. For example, note the following item indicating the use of competition as a motivating force:



*In the President's remarks to employees at the Department of the Treasury on February 14, 1969, he stated, "... when you consider this Department and what really makes it distinctive it is that it really serves the whole Government." Pictured above (left to right) is the author, Secretary Kennedy, and President Nixon greeting employees following the President's remarks.*



"The purchase of water and steam meters and coal scales for the larger buildings with a view to ascertaining how much coal is used in a given building, will encourage competition among the different shifts at the building and, by giving the office an opportunity to note and check extravagance in the use of coal, will effect savings."

The above item also hints of cost control centers and work measurement, utilizing standards—an ambitious undertaking considering that, at that time, there were 38 coal burning fireplaces and four boilers in the Main Treasury Building consuming 900 tons of coal during a cold month. Throughout the report are many items reflecting the application of paperwork management techniques—primarily the substitution of looseleaf ledgers and card-index systems for the hard-bound book ledgers. And a hint of progress to come through automation is contained in an item stating:

"The work of recording internal revenue collections has been considerably lessened by the use of a looseleaf register and an adding machine. The possession of an adding machine has saved time on several other desks."

#### **1940's—Formal Reports to BoB**

The more recent efforts of the Department in the area of management improvement date back to August 1946. At that time, in response to a letter from President Truman, Secretary John Snyder issued a directive to heads of bureaus emphasizing the need for a reduction in expenditures. This directive was followed by additional letters in October 1946 and March 1947. The March 1947 letter is believed to have established the first internal reporting of management improvements by bureaus. This letter instructed every unit in the Treasury to reexamine all procedures, methods of operation, relationships with other units, and to provide for the maximum utilization of personnel. This letter further directed each bureau, office, and division to provide the Secretary with a detailed report by May 1, 1947, of steps taken to reduce expenditures during fiscal year 1967. The success of this effort is indicated by the savings during that fiscal year which amounted to \$5.6 million. Of this amount Internal Revenue Service accounted for \$3.6 million.

During this same fiscal year Secretary Snyder introduced work simplification training for supervisors as a technique for improving management. The payment of cash awards for adopted employee suggestions was also instituted in 1947.

On July 29, 1949, the President issued Executive Order 10072 in support of the recommendations of the Commission on Organization of the Executive Branch of the Government. Among other actions this order required the Bureau of the Budget to report periodically to the President on the progress and results of the

agency management improvement efforts. As nearly as can be determined this order resulted in the first requirement for formal reporting of management improvement results to the Bureau of the Budget. The Department implemented the Executive order on August 11, 1949, by means of a directive from the Secretary to the heads of all bureaus.

#### **1950's—Upsurge in Automation**

The 1950's saw the Department continue to reemphasize and stress the management improvement effort. The commencement of automation of operations occurred during this period and was responsible for a large amount of the savings. In 1954 a record for that time was established when savings of \$20.6 million were reported. This was attributable in large part to almost \$10 million savings in IRS as a result of decentralization of its activities; improved utilization of personnel; and a revised plan for systematic examination of tax returns.

#### **1960's—Era of Nine-Figure Savings**

Savings under the management improvement program rose rapidly during the 1960's with new records being established almost every fiscal year and characterized by Secretary Fowler's statement, "We shall do more." As an example, the fiscal year 1967 savings were \$145 million, a record high for the Department. The rapid rise in savings during this period is largely attributable to advances in automation, and mechanization. Typical examples of such improvements are:

(a) IRS conversion of the tax return processing and revenue accounting to the nationwide automated file system. This was accomplished over a period of approximately 5 years and has resulted in numerous benefits such as: identification of nonfilers; verification of the mathematical accuracy of all returns; identification of unpaid accounts prior to refunding overpayments to taxpayers; prevention of duplicate refunds; systematic selection of tax returns for audit; and bringing about an increase in voluntary compliance.

(b) Bureau of Engraving and Printing acquisition of high-speed presses and conversion to the dry intaglio printing of currency resulted in savings in excess of \$5 million.

(c) U.S. Coast Guard closure of 17 stations and automation of light stations resulted in savings of \$1 million between 1961 and 1964.

A significant change occurred in the management improvement effort upon the receipt of Budget Bureau Circular A-44 dated March 29, 1965, which was revised on August 3, 1966. This directive set forth new elements in the cost reduction program which required the establishment of annual goals and plans as well as the validation of all savings. Treasury incorporated these new features into its existing management improvement pro-

gram by means of Administrative Circular No. 49 (Revised) dated June 25, 1965.

The following table summarizes the Treasury Department's achievements through its management improvement efforts (which total over \$500 million) since the beginning of the program in fiscal year 1947. The average annual savings during this period have been \$23 million; the lowest annual saving was \$3.7 million; and the maximum to date was \$145 million in 1967.

Estimated Savings Resulting from Management Improvements

Fiscal year	Recurring savings	One-time savings	Total reported
1947.....	\$5, 673, 100	( <sup>1</sup> )	\$5, 673, 100
1948.....	7, 358, 100	( <sup>1</sup> )	7, 358, 100
1949.....	7, 894, 600	( <sup>1</sup> )	7, 894, 600
1950.....	5, 404, 200	( <sup>1</sup> )	5, 404, 200
1951.....	8, 319, 500	( <sup>1</sup> )	8, 319, 500
1952.....	3, 725, 500	( <sup>1</sup> )	3, 725, 500
1953.....	12, 411, 000	( <sup>1</sup> )	12, 411, 000
1954.....	20, 625, 300	( <sup>1</sup> )	20, 625, 300
1955.....	7, 200, 000	( <sup>1</sup> )	7, 200, 000
1956.....	6, 142, 000	( <sup>1</sup> )	6, 142, 000
1957.....	6, 119, 900	( <sup>1</sup> )	6, 119, 900
1958.....	6, 769, 000	( <sup>1</sup> )	6, 769, 000
1959.....	7, 745, 100	( <sup>1</sup> )	7, 745, 100
1960.....	7, 945, 000	( <sup>1</sup> )	7, 945, 000
1961.....	8, 015, 500	\$2, 330, 000	10, 345, 500
1962.....	12, 656, 100	256, 000	12, 912, 100
1963.....	15, 952, 000	1, 025, 000	16, 977, 000
1964.....	29, 500, 000	4, 887, 000	34, 387, 000
1965.....	24, 100, 000	14, 900, 000	39, 000, 000
1966.....	25, 698, 000	18, 869, 000	44, 567, 000
1967.....	114, 283, 000	31, 398, 000	145, 681, 000
1968.....	38, 804, 000	58, 259, 000	97, 063, 000
Totals.....	382, 340, 900	131, 924, 000	514, 264, 900

<sup>1</sup> Figures on one-time savings are not presently available for these years.

## THE ORGANIZATION FOR IMPROVING MANAGEMENT

### Top Leadership

The leadership and support of the Secretary and his top aides have been an important part of the management improvement program since its beginning. These officials have taken every opportunity to show their personal interest in the program by personal discussions with bureau officials and by formal communications. From time to time they have requested special studies, such as the comprehensive management study of the Bureau of Customs.

### Assistant Secretary for Administration

The Assistant Secretary for Administration is responsible for coordinating, stimulating, and evaluating management improvement efforts in the bureaus and furnishing central guidance and assistance. The Offices of Budget and Finance, Management and Organization, Personnel, Planning and Program Evaluation, Administrative Services, and Security, all under his supervision, assist him on various phases of the program. Their role is to:

- Coordinate Treasurywide management activities and provide leadership for them.
- Serve as a clearinghouse in Treasury for information on management experience, innovations, and developments.
- Bring together bureau representatives to exchange experience, knowledge, and suggestions.
- Provide advisory services on personnel and financial management, organization, methods, procedures, and systems of control and appraisal.
- Conduct management reviews, surveys, and inspections.
- Promote the standardization and integration of Treasury automatic data processing systems, sharing of equipment, improved procurement practices, and new uses of equipment.
- Encourage better coordination of substantive functions and elimination of duplication and unessential functions.
- Coordinate, stimulate, and review the Department's program to improve services to the individual citizen.
- Emphasize face-to-face relationships and onsite visits throughout the Treasury in Washington and in the field.
- Coordinate, stimulate, and review the Department's participation in Federal executive boards in principal cities in the field.
- Assist bureaus in improving paperwork management such as directives, correspondence, forms, reports and records.
- Serve as a link with central staff agencies such as the Bureau of the Budget, Civil Service Commission, General Accounting Office, and General Services Administration on Governmentwide management matters.

### Treasury Management Committee

Each bureau is represented at a high level on this Committee, which is chaired by the Assistant Secretary for Administration. The Committee, established in 1948, meets on call of the Chairman to consult and exchange information on management problems and proposed improvements, initiate projects for improvement, and consider new approaches to improvement efforts.



## **The Improvement Program**

There are no large central management staffs in the Treasury. A five-man Management Analysis Division in the Office of Management and Organization, Office of the Secretary, spearheads the improvement of organization, management, and procedures. The staff furnishes advisory services and conducts special surveys and studies on request of top departmental officials or the bureaus. The surveys may cut across bureau lines or be confined to one bureau. They may be chaired by staff of the Division or Division staff may participate in studies chaired by bureau personnel.

The Chief of the Division chairs an Alternate Management Committee on which each bureau is represented by the official primarily interested in management improvement efforts. The Committee is especially useful in exchanging information, both within the Department and with other agencies and private industry. It also acts as a sounding board for new ideas and directives, and as a focal point in the bureaus for the dissemination of management documents.

Since the Treasury bureaus vary greatly in size, complexity, and geographic dispersion, no effort has been made to prescribe how their management improvement program should be organized. The form of organization varies according to the peculiar needs of the bureau.

Outside management consulting firms have been used on numerous occasions when specialized talent on resources are needed or when a completely objective study is required. Such surveys have been particularly valuable in getting top-level and congressional support for needed changes.

## **Financial Management**

Three small staffs in the Office of the Secretary and one in the Bureau of Accounts are engaged in different aspects of the improvement of financial management.

- A systems staff in the Fiscal Assistant Secretary's office works on management improvement projects and technical problems cutting across bureau lines in the three bureaus comprising the Fiscal Service. Special emphasis is placed on data processing and computer systems.
- A division in the Office of Budget and Finance develops systems, assists the bureaus in accounting problems relating to administrative appropriation accounting, and reviews and approves bureau accounting systems before submission to the General Accounting Office for approval.
- A staff in the Office of Management and Organization reviews and appraises internal audit systems to determine their usefulness to management and quality of performance. This staff also reviews GAO and bureau internal audit reports for recommended management improvements and works with the Division of Management Analysis on any necessary followup.

- A systems staff in the Bureau of Accounts works with the General Accounting Office and Budget Bureau to improve Governmentwide financial management.

## **Rendering Better Service to the Public**

The Under Secretary of the Treasury serves as departmental representative on this program, which is under the immediate supervision of the Assistant Secretary for Administration.

Staff of the Management Analysis Division coordinate the program, prepare the quarterly report to the Civil Service Commission, and act as secretariat for an Inter-Bureau Committee on Services to the Public. The Committee, which is chaired by the Assistant Secretary for Administration, meets quarterly to discuss problems and progress in the program.

## **Property, Records, and Safety Programs**

Several other management improvement programs are carried on in various divisions of the Office of Administrative Services of the Office of the Secretary. These are:

- A safety program to improve utilization of manpower and resources through reductions in the frequency and severity of accidents. The Director of the Office of Administrative Services supervises this program with the aid of a safety officer and the advice of the Treasury Safety Council.
- A records management program to reduce the creation of records and to make prompt disposition of old ones.
- A property management program to insure that unused equipment is declared excess so that it may be used by other agencies, and to make full use of available surpluses by the Treasury. Each year the Department declares excess and also acquires millions of dollars worth of personal property.
- A building management program to coordinate the acquisition and use of real and personal property. New space planning concepts are being used to provide more efficient use of space.

## **Incentive Awards Program**

The Department has an active incentive awards program to encourage employee participation in management improvement and to reward employees for their contributions. The Assistant Secretary for Administration issues regulations governing the program, and each bureau administers its own program within the framework of these regulations. The Office of Personnel supplies general leadership and stimulation to the program.

The Treasury Awards Committee, on which major bureaus are represented, advises the Assistant Secretary for Administration on proposed regulations and procedures, approves each award over certain amounts,



and handles special problems such as consideration of controversial cases and new innovations.

An annual awards ceremony is held at which the Secretary recognizes major contributions to the effective and efficient operation of the Department. The program has three parts:

(a) Cash awards for suggestions, outstanding performance, and special acts or services.

(b) Honor awards (certificates, emblems, and medals) for distinguished, exceptional, or meritorious services where monetary awards are normally not appropriate.

(c) Special recognition (cash or honorary) by the Secretary at his Annual Awards Ceremony for outstanding contributions to the cost-reduction program and other programs of top-level interest such as the program to improve public services, hire and train the handicapped, etc. The cost-reduction awards, which were first established in 1967, are given to the bureau judged to have made the most significant relative achievement for the year and to persons within the various bureaus who have made outstanding contributions to the administration of the program.

## **BROAD MEASURES OF EFFICIENCY**

For many years, the Department of the Treasury has used several work-unit cost and productivity factors as broad measures of efficiency. These factors do not identify or measure specific management improvements, but they do provide top management with an overview of the achievements, or lack thereof, of all efforts to improve the total operations of a given program. The following are some examples of these measures of efficiency for major Treasury programs during the 1961 to 1968 period.

### **Internal Revenue**

Between 1961 and 1968, the Internal Revenue Service increased its revenue collection by 62.7 percent while its manpower was increased by 26.5 percent.

The average revenue collected per employee increased from \$1.77 million in 1961 to \$2.28 million in 1968.

### **Customs**

Between 1961 and 1968, the Bureau of Customs increased its collections by 104 percent while its manpower increased by 13 percent.

In workload terms, formal entries increased 64 percent and total persons entering the United States increased 36 percent.

Customs collected per dollar of costs increased from \$23.81 in 1961 to \$32.36 in 1968.

### **Accounts**

The number of checks and bonds issued by the Bureau of Accounts during the 1961-68 period increased

by 44.9 percent. Personnel on this function decreased by 39.2 percent. This fact is concrete evidence of the economies of automation.

The unit cost per check was reduced from 0.0435 to 0.0270 during this 8-year period.

### **Engraving and Printing**

The output of paper currency increased from 1.6 billion pieces in 1961 to 2.1 billion pieces in 1968, an increase of 32 percent. The unit cost of production went down from \$9.21 a thousand pieces in 1961 to \$8.13 in 1968.

## **EVALUATING RESULTS**

### **The Federal Program**

On March 29, 1965, the Bureau of the Budget issued Circular A-44 (Revised) which incorporated into the Federal Management Improvement Program the requirements for preparation of annual plans with savings goals and semiannual reports of progress against these goals. Fiscal year 1966 gave us operating experience of one complete program cycle from developing plans, establishing goals, reporting semiannual progress, to reporting annual accomplishments against goals. During this 1-year operating experience, frequent questions were asked by the bureaus of the Department and by the Department of the Budget Bureau which were not clearly answerable. To identify specific areas of the program needing clarification and improvements, a cost reduction/management improvement study team was established to evaluate program operations throughout the Treasury, including its field activities, and to recommend appropriate action. The team was chaired by a member of the Office of Management and Organization in the Office of the Secretary, and had membership from the Internal Revenue Service and the Bureau of the Public Debt.

One of the principal benefits of this study was the fact that it involved joint participation by the Office of the Secretary and virtually all of the operating bureaus. As was mentioned above, two bureaus worked with the Office of the Secretary in the conduct of the study itself. Following completion of the study, each bureau designated a representative to critique the findings, conclusions, and recommendations.

On the basis of this study and review, the team determined that to measure effectiveness and bring consistency into program operations, it was necessary to have a yardstick. Such a yardstick should contain the minimum requirements for an effective cost reduction/management improvement program in any organization. Since such a yardstick was not available, the team developed its own.

## ELEMENTS OF A COST REDUCTION PROGRAM

An effective cost reduction program at the bureau level and above should consist of the following major phases, each containing the specific actions and controls indicated.

### I. PROGRAM IMPLEMENTATION AND PROMOTION

#### A. Management Support

1. Issue implementing directive establishing—
  - a. program objectives,
  - b. major program phases, including actions and controls required as a minimum,
  - c. definitions of program terms
    - (1) reportable actions
    - (2) types of savings
    - (3) other benefits
    - (4) base period and rates
    - (5) unit cost
  - d. interrelationship and interaction with other management programs.
2. Top management provide personalized support of program objectives and participation.
3. Provide adequate staffing for administration and promotion of program.
4. Periodically evaluate program effectiveness.

#### B. Orientation and Training

1. Orientation as to "savings" concept.
2. Supervisory training in management improvement techniques.

#### C. Recognition and Awards for Achievements

### II. PREPARATION OF ANNUAL COST REDUCTION PLAN AND SAVINGS GOALS

#### A. Systemtically Review all Programs

1. Plan elimination or curtailment of low-priority activities and estimate dollar/man-year savings resulting therefrom.
2. Scrutinize high-cost programs for cost-benefit relationships, and plan projects to develop new and less costly approaches to achieve the objectives in these high-cost programs. Estimate dollar/man-year savings resulting therefrom.

#### B. Plan Projects in Common Supporting Functions

(Personal administration, paperwork management, building maintenance, space utilization, etc.) Estimate savings resulting therefrom.

#### C. Document Planned Efforts and Savings

1. Identify individual projects by CR program categories.
2. Submit report on annual plan and goals to higher authority per prescribed reporting instructions and format.

### III. IDENTIFICATION OF SAVINGS NOT INCLUDED IN PLAN

Procedures must be established and responsibility assigned for reviewing areas of potential savings which were not incorporated in the annual plan.

#### A. Continuing Management Control Programs and Reports

1. Improvement of public service.
2. Position management program.
3. Paperwork management program.
4. Work measurement program.
5. Safety program.
6. Statistical reports.
7. Organization charts, functional statements, and position list report.
8. Incentive awards program.
9. Audit reports.
10. PPBS and other budgetary material.

#### B. Major Policy and Procedural Changes

#### C. Improvements in Normal Day-to-Day Operations by Individual Workers

### IV. VALIDATION OF SAVINGS

#### A. Formal Assignment of Authority and Responsibility for Validation

1. To a person, position, or organization.
2. At appropriate level to be independent and objective.

#### B. Documentation Must be Maintained

1. Previous costs, rates.
2. Present costs, rates.
3. Statistical analysis producing savings figure.

#### C. Standard Format

### V. REPORT OF CR/MI RESULTS

#### A. Feeder Reports to the Bureau level

1. At least semiannual.
2. Include progress to date and savings rationale.
3. Source—1st organization echelon below bureau.

#### B. Bureau Reports

1. Specific office assigned preparation responsibility.
2. Project identification and controls established.

#### C. Backup Material Retained

## Major Phases

The team set forth the step-by-step process it considered necessary to develop and implement a formalized cost reduction and management improvement program for a headquarters organization having at least one subordinate level of field organizations. The steps identified in this process fell into five groupings of major effort, and the team identified these groupings as the five major phases of an effective CR/MI program.

These phases are:

- Promotion and Support
- Preparation of Annual Cost Reduction Plan and Savings Goal
- Identification of Savings From Projects Not Included in Plan
- Computation and Validation of Savings
- Reporting Achievements

Each of these major phases contains action and control items as depicted above which represents the



yardstick used by the study team as a primary aid in evaluating the operation and effectiveness of the CR/MI program throughout the Department of the Treasury.

As a result of this process, the first and primary recommendation of the study team was that a cost reduction/management improvement manual be developed to replace our administrative circulars. This manual, which incorporated those features most significant to all bureaus, was written primarily by one of the reviewers, the representative of the Office of the Treasurer of the United States. Issued throughout the Treasury in looseleaf form, it contained more detailed definitions and examples to clarify areas found to be widely interpreted; provided guidelines for managing the improvement efforts at the bureau level; and prescribed stricter and more uniform procedures and formats for reporting program results.

### Savings Increase

The record achievements in our cost reduction and management improvement program for fiscal years 1967 and 1968 are, in our opinion, due in large measure to our self-evaluation process itself and to the program manual. The discussions the team had with

both headquarters and field program administrators and line managers accomplished much in clarification of concepts and objectives, and in stimulating participation in the program in the early part of fiscal year 1967. At the end of that year we reported benefits valued at \$145.6 million as compared with \$44.5 million in fiscal 1966. The new CR/MI Manual was published in the first part of fiscal year 1968 and, although we had lost two bureaus by transfer to other departments (Coast Guard to DOT and Narcotics to Justice), we achieved benefits of \$97 million that year.

### CONCLUSION

Treasury management staffs have acquired a great deal of expertise and sophistication since the first planned efforts were made to improve management. But we still have a long way to go. In a large, complex, and far-flung department such as the Treasury, the opportunities to improve management are endless. The improved methods we develop and install today are susceptible to further improvement tomorrow. The challenge is to meet constantly higher goals and to decide where to concentrate the limited resources and facilities available for this purpose. □

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### VE NETS FIRM \$205,000

The Army and the Defense Supply Agency recently participated in a ceremony to recognize the value-engineering efforts of the Akron-headquartered Goodyear Tire & Rubber Co.

Goodyear's participation in the Defense Department's Value Engineering program netted the firm a total cash payoff of \$205,000, their share of a savings to the Government of \$752,000.

Goodyear effected the money-saving VE changes in producing 3,000- and 10,000-gallon collapsible fuel tanks for the Army Mobility Equipment Command, St. Louis. The changes ranged from substitution of less costly materials to elimination of components proved to be unnecessary.

The brief ceremony held at the Army Mobility Command Headquarters featured presentation of a check and an award. Col. O. G. Miller, Commander, Defense Contract Administration Services Region, Cleveland (where the contract is administered), presented a check for over \$104,000 to Mr. E. M. Eichman, General Manager, Aviation Products Division of Goodyear. Mr. Eichman also received a Certificate of Achievement, presented by Maj. Gen. Charles C. Case, Commanding General of the Mobility Equipment Command.

During the ceremony, General Case cited Goodyear for cost consciousness and highly successful efforts to reduce the cost of defense equipment while retaining essential military requirements. The photo shows (left to right): General Case, Colonel Miller, and Mr. Eichman.





# *The Management and Technology of—* **DEFENSE COMMUNICATIONS TODAY**

**C**OMMUNICATION in this decade presents an exciting story. It covers two revolutions, one in management and one in technology. This article will relate how these two revolutions affected each other, our position in Southeast Asia, and how Southeast Asia affected them. Each of these events would have had far-reaching effects. Together they have brought us far up the road of progress in a remarkably short time.

## **Technology**

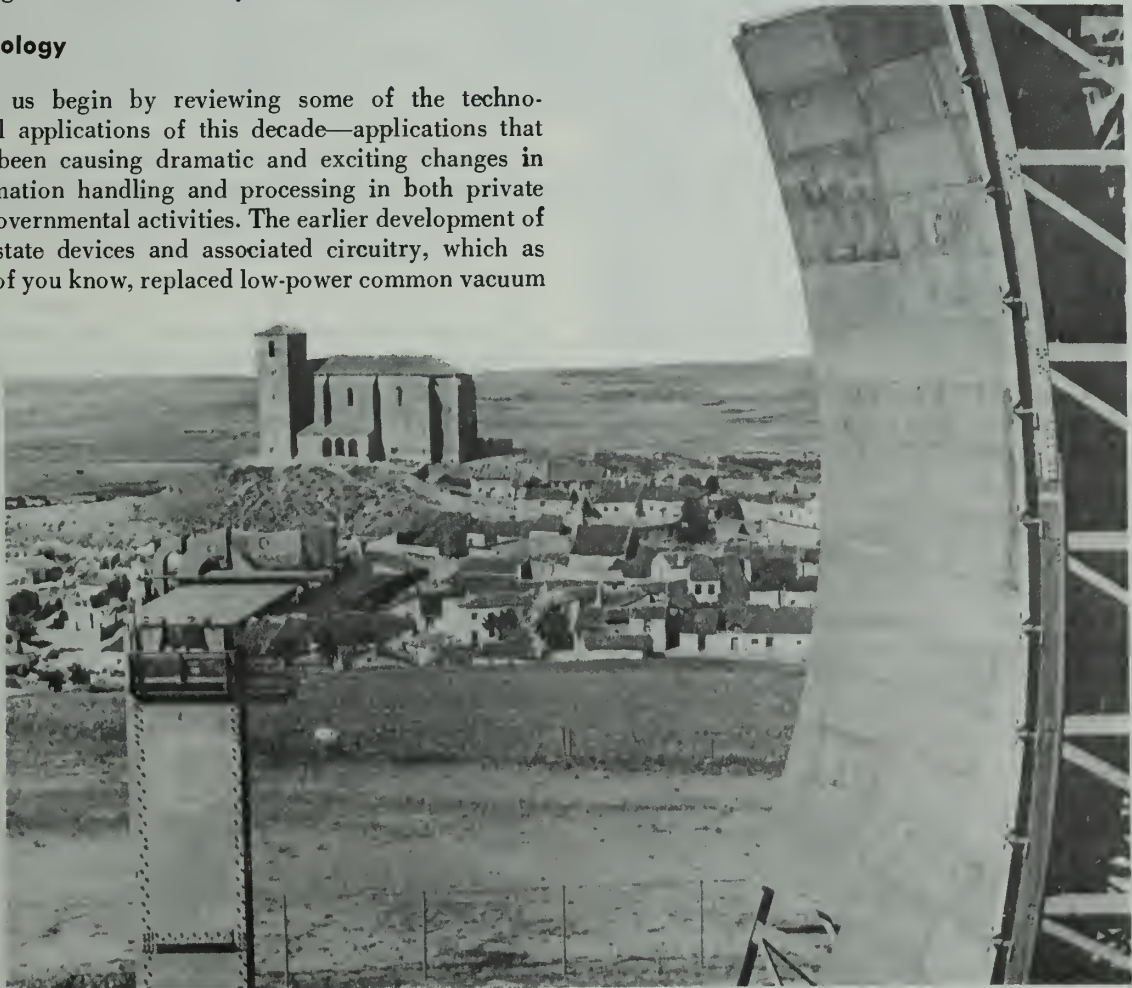
Let us begin by reviewing some of the technological applications of this decade—applications that have been causing dramatic and exciting changes in information handling and processing in both private and governmental activities. The earlier development of solid-state devices and associated circuitry, which as most of you know, replaced low-power common vacuum

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**By PAUL H. RILEY**

*Deputy Assistant Secretary of Defense  
for Supply and Services*

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*The 20th Century blends with the past in this old world setting where modern communications equipment frames a centuries-old church. Huge billboard-shaped antennas at this AFCS tropospheric-scatter communications site in Humosa, Spain, receive and transmit signals over the horizon between two continents.*



*The author congratulates Captain Norman W. Gill, USN, on receipt of the Navy Commendation Medal for his outstanding communications planning, cost consciousness and exemplary management. One of Captain Gill's proposals resulted in the cancellation of a \$500,000 programmed military construction item. At left in photo is Lt. Gen. Harold W. Grant, USAF (Ret.), OSD Director for Telecommunications Policy; at right is Rear Admiral Robert H. Weeks, USN, Vice Director of the Defense Communications Agency.*

tubes, had made miniaturization possible with its use of low power and its concomitant advantages of low voltage and heat. This technique was fundamental and vital to two important 20th century developments: the communications satellite and computer.

### Satellite

The satellite has captured our imagination. It has made, and is making, revolutionary changes in communications capability. It has multiplied by 60 times our capability to transmit information by increasing the width of our usable frequencies. It can make many more overseas communications channels available and less expensive, for either private or government uses. Where we used to have one telephone voice circuit, we now can have (theoretically at least) 60 circuits, unlimited by terrain or water topography or other difficulties. There are obvious uses for this capability in defense. In addition to taking advantage of this breakthrough, both by leasing private capability from INTELSAT, the international satellite consortium headed by COMSAT, and also by developing our own Defense capability for specific long-haul unique and vital uses, we foresee many new applications of satellite communications to warfare. Tactical satellites may

well become the most effective and efficient method for two military users, separated by a few miles of jungle or other difficult terrain or air space, to use in communicating with each other. This could eliminate costly ground systems and also decrease vulnerability. It can also be used effectively in an air-to-air system in connection with airborne command posts. We have these possible uses, as well as many others, under close study. We also have an IDCSP (Initial Defense Communications Satellite Program) which has 25 operational satellites in orbit and 34 ground terminals. This provides us with some vital long haul operational circuits *now* which we wouldn't have today if we had not moved fast, early in the satellite era.

### Computers

There has been much publicity about the development and use of computers in Defense. Computers have two direct and obvious applications to communications and information processing. One is the well-known use involving the processing, storage, and recall of information. The other application is as a component integral to communications systems where it is used to control routing or the switching of multiple communications channels derived from the increased frequency width



made possible by new techniques such as the satellite. An example of this application with which you are familiar, is the direct-distance-dialing feature of our private telephones.

We in Defense have, under various states of completion, worldwide communications programs using this switching technique. One of these programs is AUTODIN (Automatic Digital Network) which will modernize and automatically route our transmission of written messages, or as my communicators say, record traffic. This system will replace much of our electro-mechanical equipment and save much of the manpower used to operate and maintain it.

Another new system is AUTOVON (Automatic Voice Network) which is our own Defense direct-dialing capability for selected important users. This system, for example, will permit a military commander in South Vietnam to dial directly another military subscriber in the U.S. mainland or Germany, or wherever he may have a need to call and ask for a spare part or a replacement or whatever.

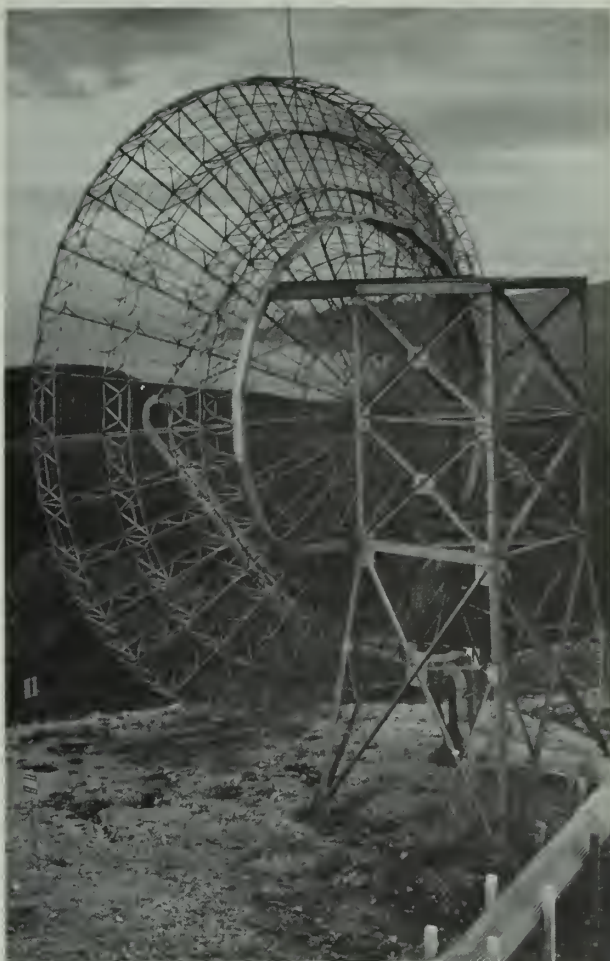
A third program is AUTOSEVOCOM (Automatic Secure Voice Communications) which is a voice system insuring privacy to protect our secret-type information where necessary. This too will enable a military commander to dial his party directly and will enable two military commanders to discuss secret-type information, such as intelligence, coordination of plans or actions, all without fear of enemy evesdropping.

### Improvement

There also have been great advances in cryptography during this same time and we are taking advantage of them in our new systems. These advances also are based largely on miniaturization and the use of the computer.

During this period other more conventional methods of communication were very much improved. For example, tropospheric scatter, or tropo as it is commonly called, is a transmission method which uses high power to transmit large amounts of information at the troposphere. The troposphere deflects this stream to a predetermined point on the earth's surface approximately 300-400 miles away. It is very much like a hose aimed at a ceiling reflecting enough of the stream of water into an area to permit effective reception. This method has been greatly improved and is used to advantage in Southeast Asia where landlines were impossible due to the difficult and primitive terrain as well as their vulnerability to enemy action.

Submarine cables have become much more efficient. For example, they have been improved from their early capability of 24 telephone channels to a capability of 120 channels. They, too, have had many uses in Defense, including Southeast Asia. Other advances included improvements to HF (high frequency) equipments and to microwave transmission, a method using



*This 60-foot parabolic antenna is perched on the side of a mountain overlooking the Sea of Marmara (Turkey).*

VHF line of sight which is very reliable and efficient for short distances. We use this method on and around many of our base complexes and particularly in SEA. These applications and improvements have changed dramatically our ways and capabilities of doing business. We will now review how we have tried to cope with these changes and the management revolution in communications which have taken place at the same time.

### Management

Let us begin by reflecting on the state of communications in the Department of Defense at the start of this decade. At that time there was no cohesive Defense-wide communications system. We had only Army, Navy, and Air Force communications. If you will visualize with me hundreds of communications circuits in the form of water hoses, all interconnecting hundreds of houses in a suburban development, you will start to have the basic picture. Now let us also extend our visual projection another step and consider each house as a

communications user or subscriber and categorize each as Army, Navy, and Air Force or as red, green, and blue.

Now can you picture Army red hoses connecting Army red houses, Navy green hoses connecting the Navy green houses, and the Air Force connecting its blue subscribers? This situation, with all of its criss-crossing of hoses, resembled the proverbial bucket of worms and unfortunately resembled our communications system.

This mess could be explained and understood in various ways. In some ways its development was a logical outgrowth of the historical military responsibilities formerly assigned each Military Department and it could be defended on that basis. But even if it were understandable, there were many obvious and compelling reasons why its continued existence could not be tolerated.

The first reason was the change in the nature of warfare itself. Time had become the most fundamental and critical factor. The need to respond in seconds or minutes began to depend on communications more than at any time in the history of warfare. A second factor was the need for compatibility of communications between Army, Navy, and Air Force. We had to be sure that we could send our Department of Defense, or national command authority instructions, through any of the three colored hose systems to the red, blue, or green houses which represented our military commands and our fighting capability. A third factor, compelling change, was the sharp increase in the price of hoses and the fact that all users were pressing for more and longer hoses. Much of this increased demand, incidentally, was for a single expensive hose, or in communications language, a dedicated circuit, installed and ready to meet specific emergency situations. In the absence of an emergency, the hose was not used. Unfortunately, there were too many hoses of this nature.

It should be emphasized that this state of affairs should not reflect adversely on the Military Services and it is not the objective of this article to be critical of them. The Services were concerned, and many officials were trying to change and improve the situation. However they, at the same time, were learning to use the new technologies and they were buying the new products and applying them to their military tasks. For example, the Air Force under exceptional leadership, moved out in 1961 and consolidated its blue hoses by absorbing them into a single blue pipeline system. It also established a centralized communications command to operate and manage its system. The Army made certain proposals along these lines, but didn't make too much progress until later. The Navy because of dispersal and movement of vessels had a less compelling and somewhat different situation.

This, in short, was the historic communications legacy with which we in the Department of Defense were con-

fronted shortly after the turn of this decade. In essence, it resulted from the Military Departments trying to take advantage of new technologies and products. Unfortunately, there was no cohesive philosophy or framework within which the new products, and their costs, could be managed.

Now, how has the Department of Defense addressed this problem and how has it been put into philosophical focus? A philosophy based on the management of our large commercial communications organizations had obvious appeal. Such a philosophy, if applied, could have established a separate company or organization for the purpose of operating and managing all Defense communications and undoubtedly would have achieved large economies. The military constraint to this philosophy was the classical desirability of a commander to have control of the resources necessary for him to attain his objective. In this sense, and particularly considering the new importance of time, communications had become a key resource.

As a result, any possible divorce of communications from the military chain of authority was viewed with real apprehension and resistance. It was within this situation and timeframe that the Defense Communications Agency (DCA) was conceived. DCA was organized as a small DoD management agency to insure compatibility, effectiveness, and efficiency within Defense communications. It was given the task of establishing and managing single integrated Department of Defense communication pipelines to each neighborhood or area where the various service users could attach their own hoses. Each military service retained full control over the use of its own individual hoses, or as we say in the communications language, their own tactical subsystems tailored for specific and intimate use with their own specific weapon systems, such as Minuteman, Polaris, SAC alert nets, and others of this type.

It should be emphasized that a system of priorities and allocations of trunks within the pipelines was developed. Its purpose was to insure that the information, which was critical from a time viewpoint (such as intelligence, early warning, and command control) was given the special handling previously facilitated by the rarely used dedicated circuits.

You will note that DCA would only establish the multicolored pipelines and manage them. The pipelines are operated and maintained by the Military Services. For this purpose each Military Department has been assigned operating responsibility for specific geographic areas. The assignment resulted in organizational consolidations in most areas of the world and saved large amounts of equipment and manpower. This overall system of pipelines, established and managed by DCA, and operated and maintained by the Military Services, now provides the long-haul communications service to all Defense users. It is called the Defense Communications System. The system is managed by



DCA which reports to the Secretary of Defense through the Joint Chiefs of Staff for the purpose of insuring that the communications service is responsive to the needs of our military commanders. The system has worked. The conglomeration of multicolored hoses has been eliminated and in its place we have established an orderly system of Defense-wide communications pipelines. This has reduced the amount of hose we were buying and instead put the money into larger pipelines, where we have gotten more communications for our money.

These changes, as a result of our management revolution, have not come easily or quickly nor are they yet completed. They have been evolved slowly by hard, determined leadership and effort in the course of this decade. It was during this same timeframe that the challenge of Southeast Asia put our new systems to a real test.

### **Southeast Asia**

There are few possible environments which could have offered more difficulties for communications than SEA. To begin, it is a primitive area with mountains and jungles and heat and humidity and all the other natural obstacles you can name. There was no existing communications capability. Most nations have some communications capability, of either a military or civilian nature. This area had none. In places they still used runners. Not only did it not have internal communications, it had only very limited commercial HF (high frequency) to the area from the rest of the world. This then was the situation which we found in SEA when we had to support our national effort there. Our people immediately developed and identified a large requirement for communications. This requirement was based on the nature of the conflict itself, with its political overtones, and its fast-moving military characteristics. This required capability was also necessary to the employment and coordination of allied forces and civil programs—all very closely related to our military effort.

We established a three-step approach to this problem and we have followed this pattern throughout our commitment. First, we deployed the mobile equipment which we had stockpiled in our inventory for just this purpose. This equipment is lightweight and is easily transported and set up. It is not long lasting nor can it process large quantities of information. Its installation also required considerable power and air conditioning as well as basic shelter. We overcame all these problems and established a hard-core, limited but effective, capability under the worst possible circumstances. This capability enabled our commanders and other authorities to proceed with their business. Without this initial capability they would not have progressed very far and the progress might have

been more expensive. Secondly, we programed permanent high quality and quantity communications for internal use within the area and also from the U.S. mainland to the area. This program has resulted in the installation of one of the most effective tropospheric scatter systems in the world and is the most fundamental and important communications improvement in SEA. This system has DCA trunks, the same as had been evolved earlier in other locations, to all necessary sections of the SEA area. The capability of these trunks varies with the need from a high of 240 channels to 60 channels. They are all of high reliability and quality and have been installed to meet the quality standards established by DCA. They are every bit as good as the private telephone circuits within your own neighborhood.

There is an interesting innovation to the establishment of this internal high-quality trunking system. We were in a hurry for this capability and we had used a lot of tropo in it for the reasons I mentioned earlier. So we diversified into submarine cable and gained some time and capability. We laid a 60-channel submarine cable down the long coastline of South Vietnam, looping it into the shore at six different locations, and used it for internal trunking. We also looped it all the way around to Thailand and provided another path to that vital area. Our system of loops also was designed to reduce its vulnerability to a very low degree. This project normally would have taken 3 years. We did it in one.

Effective relays and switches are fundamental and vital to any sound trunking system. For our SEA trunking system we have installed some of the equipment developed for our U.S. mainland systems which I mentioned earlier. We diverted AUTODIN switches and other ancillary equipment, and installed it in SEA. We overcame the heat and humidity, the dust and the mud and provided the sophisticated maintenance it requires. As a result of urgent military requirements, secure voice equipment to insure privacy, similar to that developed for AUTOSEVOCOM in the United States, was installed years ahead of schedule. An advanced system of voice switches was installed to link all subscribers in SEA so that the tanker crew in Thailand can dial and talk to the aircraft he will refuel in Vietnam and the fighter pilot in Vietnam can dial and talk to the infantryman he will support. These represent the payoffs of our system as it is used within Southeast Asia. However, communications with the U.S. mainland is also required. We started with HF which was all that existed. Since that time we have installed a 60-channel submarine cable between South Vietnam and the Philippines. It links up there with channels we leased in a new commercial cable between the Philippines and Hawaii.

It should be emphasized that wherever commercial facilities exist, we give close study and attention to choosing the most effective and economical blend of military and commercial capability. Here we leased commercial cable capability. We also have leased channels in INTELSAT for more channels to this area from the U.S. mainland.

Lastly, we have our own Defense system, with its 25 satellites and 12 terminals in the Pacific area. This reduces our vulnerability and give us flexibility and capability we could not get in any other way. It enables us to use the frequency bandwidth mentioned earlier to transmit all kinds of information in great quantity, including high quality reconnaissance photographs directly from Saigon to Washington. Put simply, this is the first time we have had communications from the White House to the foxhole.

As a result of our experiences in Southeast Asia, we have developed and implemented a new concept for use in similar situations should they arise in the future. This concept will eliminate the two- or three-step plan of deployment of light mobile equipment and its eventual replacement by permanent high quality and capacity facilities. The new concept would use heavy transportable equipment which could be deployed initially into an emergency area such as Vietnam. The transportables would have not only the advantages of being able to respond quickly to an emergency need, as has the mobile in the past, but they also would have the great advantage of providing immediate high quality and capacity communications. Other corollary advantages are that there would be a minimal requirement

for the construction of permanent-type buildings, air conditioning, and power. Upon termination of the emergency situation to which they were deployed, they could be extracted rather quickly and prepared for subsequent redeployments. This concept was perceived early in the Vietnam situation and development, production, and procurement were initiated. As a result, equipments of this type are now being obtained for future use.

Our management system, evolved earlier in other parts of the world, and coping with the thrust of technology, and addressing the historical anarchy which it inherited, has been put to the acid test in SEA and it has produced. If we hadn't had our management foundation, these capabilities would not have evolved nor been employed effectively. The real payoff has been that this capability has enabled us to employ the best professional military force this Nation has ever fielded. We have been able to support both that military force and our civil efforts to meet national objectives in a more efficient and effective manner because of our communications capability. Our defense communications capabilities is a key logistic resource and it has tied our supply system, our transportation and construction capabilities, our intelligence and operations centers into a unified and meaningful, well-directed national effort.

To summarize, one must conclude that without the results of our two revolutions we would not have our existing capability within and to SEA. Without this capability, our national effort would have cost us infinitely more—in terms of national resources and more important—LIVES. This is the real communications story and its effect in SEA. □

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### MILLION-DOLLAR SWITCH

Some \$1 million will be saved in 2 years on AUTOVON (Automatic Voice Network) service charges as a result of a value engineering proposal made by a Defense Communication Agency employee. (AUTOVON is designed to provide the Department of Defense a worldwide communications system for handling voice and graphic communications on an automatically switched basis.)

Edgar H. Heald, of DCA's AUTOVON Project Management Office, Arlington, Va., recommended that the size of AUTOVON switches rented at four locations be reduced in size because minimum service charges for unused service were being incurred. The sites are at

Iron Mountain, Mich.; Medford, Oreg.; Cedar Brook, N.J.; and Wyoming, Minn. Howard Beaver, a Communications Specialist with DCA's Defense Commercial Communications Office, Scott Air Force Base, Ill., assisted in staffing Heald's proposal.

Mr. Heald is a Communications Specialist, with a general background as a Communications Staff Officer with the Air Force, from which he was retired January 1964 after over 23 years of service. He lives at 900 Lamberton Drive, Silver Spring, Md. His proposal was made under criteria of the DCA and DoD Cost Reduction and Value Engineering Programs.



# DIMES FOR DOLLARS AT CHARLESTON

By CAREY L. MILLER  
*Supply Systems Analyst*

**D**IMES translates into dollars for the Cost Reduction Program at the Charleston Naval Shipyard. The DIMES program at Charleston was responsible for validated savings of \$1,225,000 during fiscal year 1968.

Although the Defense Integrated Management Engineering Systems (DIMES) programs at CNSYD are relatively new, the amount of savings as a result of their studies is indicative of how far they have progressed.

The two primary contributors were the Production Department's Method and Standards Branch led by H. C. Chilcote and the Supply Department's DIMES Branch supervised by C. L. Miller.

"The support we get from our DIMES analysts is really a boost to our program," said E. B. Condon, the shipyard Cost Reduction Director. "I think the studies they perform contribute greatly to holding down costs and there is no better way of spreading the word than having savings validated through our program."

Examples of savings reported include \$209,000 saved in labor for fire watches aboard the U.S.S. *James Monroe* (SSBN-622) while undergoing overhaul. Labor for watches during a previous overhaul averaged 237 man-hours per day while labor for watches on the SSBN-622 averaged 98 man-hours per day. The Methods and Standards Branch conducted work sampling and procedures studies which allowed better control of manpower. The savings as a result of these studies, when projected through future scheduled overhauls, amounted to a total of \$990,000 for a 3-year period.

Another savings report submitted by Supply's DIMES Branch concerned the elimination of a crew of riggers from the receiving warehouse. The DIMES Branch conducted work sampling studies of the two rigger crews assigned to Supply and recommended that one crew could do the job. This recommendation resulted in \$11,000 savings during fiscal year 1968 and \$51,000 for a 3-year period.

Other savings reported by the two DIMES Branches include those directly related to overhaul work and those which reduce overhead costs. Some savings are the result of staffing recommendations made by Supply's DIMES Branch. An item submitted by the DIMES Branch this year based on a reduction of four equipment specialists in Supply's Technical Branch was validated for \$41,000.

Considered a "rule of thumb" by both NAVSHIPS and NAVSUP is the criteria that a methods engineer should produce recommendations which result in savings equal to twice his annual salary. Supply's DIMES

Branch has had validated savings equal to 3.8 times the annual salaries of its analysts since the program was initiated in CNSYD in January of 1966. This translates to \$134,760 validated versus \$38,325 in salaries.

The savings reported by the Methods and Standards Branch of the Production Department were primarily responsible for making CNSYD the No. 1 shipyard in savings validated during fiscal year 1968. An example of savings by Methods and Standards was a new procedure for overhauling missile air and nitrogen flasks on the U.S.S. *James Monroe* (SSBN-622). A new process instruction provided for overhauling the flasks in-place and resulted in a savings of \$783,000 on the SSBN-622, and future savings of \$853,000 each on the SSBN-625 and SSBN-598.

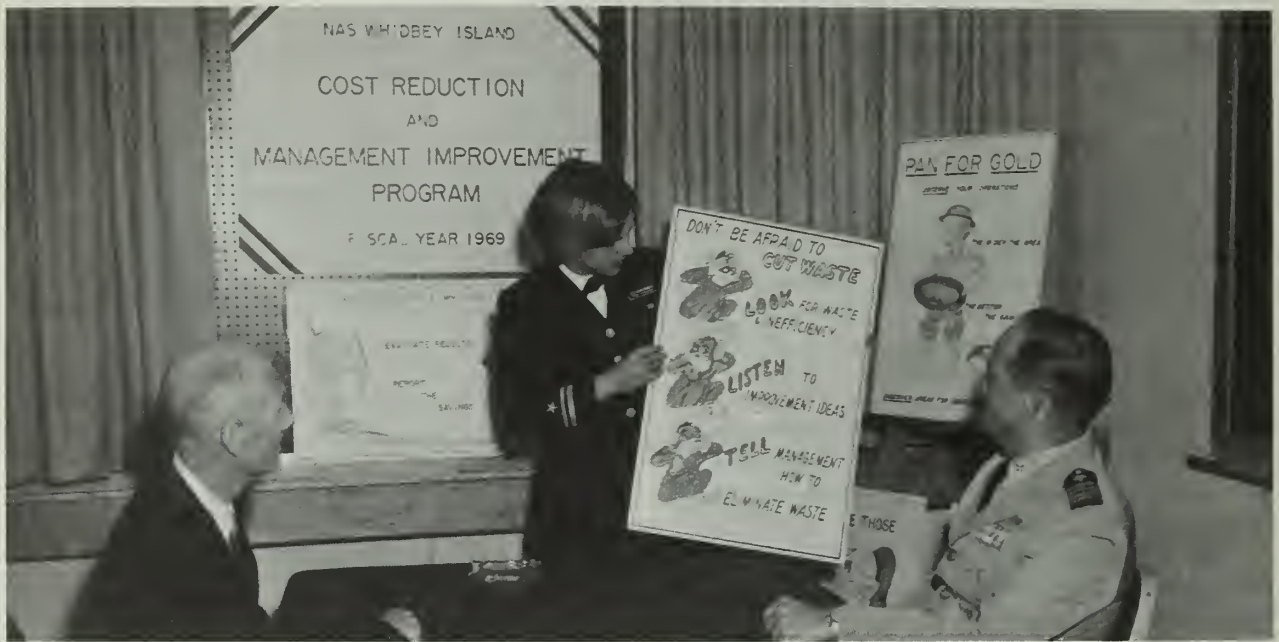
Thus, the Cost Reduction Program serves as a valid measurement of the effectiveness of the methods engineering program at the various DoD activities. To claim savings is one thing, to have them validated is another. It is the validation process that lends credibility to savings reported by analysts. Although there are many indirect savings which result from methods studies, only those which stand the test of Cost Reduction Program criteria should be considered in computing the effectiveness of the methods engineering function.

Fortunately, validated savings are also a measurement of management's effectiveness as well. Most methods engineers are quick to point out the fact that they do not have the authority to place their recommendations into effect. They have to depend on top management to take action before they can report savings as a result of their recommendations. If an activity has a low effectiveness ratio for their DIMES analysts, top management as well as the analysts should be given a close look.

Another important way in which the Cost Reduction Program aids DIMES is in the exchange of information among various DoD activities. Methods engineers at Charleston always closely inspect savings reports from other activities. The inspection sometimes reveals a study made at another activity which is applicable to Charleston.

Favorable publicity gained through the Cost Reduction Program helps methods engineers in their search for improved ways of doing things. There are lower level managers throughout DoD who believe the DIMES program is some type of mystical analyst retention system. Unfortunately, these managers are often the ones the struggling methods engineer must win over if he is to succeed. □

## "MANAGEMENT IMPROVEMENT"—WHIDBEY ISLAND STYLE



*Captain Beecher Snipes, Commanding Officer of the Naval Air Station, Whidbey Island, discusses the promotional campaign for the Cost Reduction and Management Improvement Program at NAS with D. O. Ryan, Management Assistant and Lt(jg) S. Canfield, Public Affairs Officer.*

The enthusiasm of top management in backing an activity effort can be demonstrated in various ways. To enhance the Cost Reduction and Management Improvement Program at the Naval Air Station, Whidbey Island, a continuous 8-month publicity and information program for fiscal year 1969 has been in effect since November 1968. As stated in the establishing directive, NASWHIDBEY NOTICE 5200, the purpose of this series is twofold: "(a) To acquaint Station managers and workers, both military and civilian, with significant techniques, and (b) to encourage their application to achieve improvements and resulting savings that will meet the reporting criteria of this program."

Each month a specific theme is observed and departments of NAS act as sponsors for the month. For the first month, prime emphasis was placed on the theme "Management Improvement" and the sponsor was the management assistant. Subsequent months carried such themes as "Work Methods Improvement," "Material Utilization and Waste Prevention," and "Equipment Utilization Review," with the Public Works Department, Air Operations Department, and Intermediate Maintenance Department, respectively, serving as sponsors.

Kickoff for the campaign was made by the Commanding Officer's announcement in the activity newspaper "Prop Wash." Capt. Beecher Snipes said, "We must challenge, therefore, every function, operation, and

method of our activity. Simple direct and more economical ways of getting the job done are a necessity . . . I am happy to take this opportunity to emphasize again my own personal interest in the support of an effective, dynamic Cost Reduction and Management Improvement Program at this station."

The greatest portion of this campaign is being carried out by various forms of publicity and promotion. Daily notices in the "Plan of the Day" under the heading of "Management Improvements" tell of actions taken by station personnel to improve management of operations and to attain better utilization of manpower and material resources. Seeing examples of actions taken by local organizations tends to generate competition among employees and components of the NAS when asked, "Will your activity be represented?"

Other promotional means employed are poster displays, publicizing of employee suggestions, handouts to supervisors, and tips on management improvement techniques which can lead to savings when properly applied.

To date the intense concentration on promoting and publicizing the Cost Reduction and Management Improvement Program has been very effective at NAS, Whidbey Island, as evidenced by stationwide comments, informal requests for assistance in preparing individual savings actions, and an increase in the rate of actions reported.



# MANAGEMENT AND THE METRIC SYSTEM

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By Dr. A. V. ASTIN  
*Director of the  
National Bureau of Standards*

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ON AUGUST 9, 1968, President Johnson signed into law the Metric System Study Bill, Public Law 90-472, which authorized the Secretary of Commerce

“to conduct a program of investigation, research, and survey to determine the impact of increasing worldwide use of the metric system on the United States; to appraise the desirability and practicability of increasing the use of metric weights and measures in the United States; to study the feasibility of retaining and promoting by international use of dimensional and other engineering standards based on the customary measurement units of the United States; and to evaluate the costs and benefits of alternative courses of action which may be feasible for the United States.”

There has been considerable congressional interest in such legislation for most of the past decade. However, it was not until Great Britain announced its decision in 1965 to move toward the metric system that the interest developed sufficient momentum to secure enactment of the bill.

## Growth of Metric Interest

The original metric system is nearly 180 years old. It was only gradually accepted throughout the 19th century, but after World War II it began rapidly to take on the role of the single international system of units for physical measurement.

Recently, India, Japan, and Communist China, among the major nations, embraced the system fully and many of the smaller and new nations have joined them. Even in France, the parent country of the system, it is just within the past decade that it became the only legally valid measurement system. In 1960, the International Bureau of Weights and Measures, the intergovernmental treaty organization responsible for providing the basis for compatible measurements throughout the world, revised and extended the metric system into a complete international system of units known briefly as SI. At the end of 1968 only the United States, Canada, Australia, and New Zealand among the technologically sophisticated nations were not fully metric (SI), converting to it, or planning to convert to it. Such trends impelled the Congress to authorize the study program to determine what the United States should do in the light of developments tending to isolate our customary system of weights and measures.

Throughout the period of gradual, then increasingly rapid, convergence toward the metric system many groups and organizations have made the equivalent of management decisions to enable them better to cope

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*“It is essential, therefore, that an objective, factual appraisal of the advantages and disadvantages to DoD of the metric system of measurement, and engineering standards expressed in metric terms, be developed as input for this national survey.”—Paul Nitze, Deputy Secretary of Defense, Sept. 27, 1968.*

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*The National Bureau of Standards, Gaithersburg, Maryland*

with the trend. Scientists have long used metric units to describe the quantitative results of their experiments, although they tend to use our customary units to describe the characteristics of their equipment. U.S. engineers, on the other hand, tend to operate almost entirely with the traditional English units, except for electronics and radio engineers.

In the mid-1950's the pharmaceutical industry decided to describe the physical characteristics of its products in metric units, and milligrams are now commonplace in the drug market. The American Society for Testing and Materials, the major private organization in the United States for developing standards for industrial materials, now describes most of its standards in both customary and metric units. Defense Department management now requires that the performance characteristics of much of its ordnance equipment be described in metric units in order to facilitate cooperation with NATO and SEATO allies. A significant number of U.S. industrial firms, particularly those with branches abroad, now require dual dimensioning (customary units and metric) on engineering drawings.

The simultaneous use of two systems of measurements is now fairly common in our industrial system and the two-system trend will probably grow as a U.S. response to the international trend. Under present Fed-

eral law and policy the choice of units to be used in industrial practice and commerce is for the most part a free management decision completely in the hands of individual firms or organizations. (Electrical units are an exception; they are defined by law.) This has been a traditional characteristic of our free enterprise economy. Curiously enough, the only units for length, area, volume, and weight that have been legally authorized by the Congress are the metric units. This was done in 1866, with the intent to *permit* the use of these units in trade and commerce. The congressional authorization had little impact on trade and commerce; its major consequence came in 1893 when the Treasury Department, then responsible for weights and measures, decided to abandon independent standards for the yard and pound and to derive those units through numerical ratios from the meter and kilogram.

Obviously the dual use of two systems of measurement units gives rise to inefficiencies. More work is required, inventory needs may expand unduly, and opportunities for error increase. In addition the decision concerning usage from what might be optimal internal procedure for an individual firm must be qualified by requirements imposed by suppliers, customers, and competitors. These are problems over which a company manager has little or no control. Thus pressures will



build for a single standard system. The congressionally authorized study poses the major question—Shall we continue the free choice mixed usage of two systems or take deliberate action to encourage use of one system, either metric or customary?

### Scope of the Study

The language of the Metric Study Bill states:

“In carrying out the program described in the first section of this Act, the Secretary, among other things shall—(1) investigate and appraise the advantages and disadvantages to the United States in international trade and commerce, and in military and other areas of an internationally standardized system of weights and measures.”

The modern version of the metric system, SI, is the only existing “internationally standardized system of weights and measures.” The major inch-pound using nations achieved accord on international values for their units in 1958 but the volume standards still differ by as much as 20 percent. Achieving full international accord on a system based on our traditional units seems highly unlikely. Hence the only practical interpretation of the Congressional assignment is to evaluate the trade and military factors with respect to increased use of the metric system by the rest of the world and by the United States.

With respect to international commerce and trade the problem is extremely complicated. Preliminary analysis shows quite clearly that over the past several years our exports of most technological products to metric countries have declined in comparison with our exports to nonmetric countries. It is not yet clear, however, that this trend is due to our limited use of the metric system. Even more difficult to evaluate is the possibility that increased use of the metric system within the United States will increase the imports into our country from metric nations. Thus, it is far from evident, in spite of many unsupported claims from metric proponents, that increased use of the metric system within the United States would have a favorable effect upon the Nation’s dollar export problem. This is a critical area for the study to explore carefully and objectively.

The factors underlying the British decision to embrace more fully the metric system are not analogous to the major factors the United States must consider. Britain’s goal of joining the European Common Market was most likely a major incentive since the present Common Market is fully metric. In addition, foreign trade is a much more important fraction of the British economy than of our own. Less than 5 percent of our gross national product is represented by exports, compared to approximately 15 percent for Great Britain. Furthermore most British exports are manufactured products dependent upon measurement units where only about one-third of ours involves products of this type. The final decision concerning our optimum course of

action for the United States must evaluate advantages and disadvantages significantly different from those that influenced the British decision.

In the military area the situation is equally complicated. At congressional hearings on the proposed study a representative of the Department testified:

“It is clear that the adoption of the metric system would have such extensive effect on the military services of the United States that it would be impractical for the military services to remain on the English system while the country changes to the metric system, or for the military to change measurement systems in a substantial degree while this country adheres to the English system.”

Inasmuch as the law requires an evaluation of military factors, arrangements have been made for the Department of Defense to develop information concerning its highly specialized problems with respect to possible increased use of the metric system within the United States. On September 27, 1968, Secretary Nitze, acting on behalf of the entire Department of Defense, sent a memorandum to the Secretaries of the Military Departments reading in part as follows:

“The bill clearly contemplates significant participation by the Department of Defense in identifying and defining the military interest in the conduct and results of this study. The effects on military operational and logistics support capacity will necessarily constitute an important consideration in the conduct and evaluation of the study.

“It is essential, therefore, that an objective, factual appraisal of the advantages and disadvantages to DoD of the metric system of measurement, and engineering standards expressed in metric terms, be developed as input for this national survey.

“It is requested that the Air Force assume responsibility for leadership in developing plans for developing the above military input and leading the participation of the Department of Defense in the study authorized in the subject bill.”

Thus, the vitally important participation of the Department of Defense in the study has been established and inclusion of the views of the military in the final recommendations is assured.

### Levels of Metric Reaction

In appraising the advantages and disadvantages to the United States of increased use of the metric system the study group has identified three types or levels of interaction which have been labeled as: accommodation, adaptation, and conversion.

*Accommodation* represents a minimal response to increased use of metric units. It can be employed effectively when there is little use of measurement units in an organization or an individual’s activities. It is the response to the metric system which a tourist makes when traveling in a metric country knowing that this

will be a temporary matter for him or that it represents a situation which will not occur frequently.

If metric units were to become, either by law or common practice, the only units used in trade this would be the initial response of a citizen, not intimately involved in these problems, to the metric system. He would continue to weight things on existing household scales in pounds and recognize that in the marketplace 2.2 pounds is equal to 1 kilogram. This is the response that each citizen would make to a new array of metric measures until, through the continued use of the metric measures and metric terms, these would become familiar to each individual. The important aspect of accommodation is that measuring equipment is not changed and conversion tables are used to transfer from customary units to metric units. The presently growing use of dual dimensioning represents our industrial *accommodation* to increased use of the metric system.

*Adaptation* is the second level of response. It represents the situation where quantities and physical properties of products are expressed primarily or solely in metric units. Effective adaptation would, of course, require changing the measuring instruments so that readings could be made directly in the metric language. In many cases this could be done simply by posting new calibrated scales over old ones (as for example with grocery store scales). In other cases new instruments would be necessary (as for example with machinists' micrometers). Coffee cans and milk bottles would not be *adaptation* in that the sizes of things are not changed (except for a few measuring instruments), only the language in which they are described is changed.

*Conversion* is the most complete response to increasing metric usage. In this case the individual operates as if no other system of units existed. Sizes are chosen for new items in round numbers in metric units or their submultiples. Metric stock sizes are used. Packaged goods are supplied with their contents given in round numbers in metric units, such as kilograms or liters or their submultiples. Conversion describes the extent of adjustment which the physical scientists have made to the metric system. It describes what the pharmaceutical industry has done in the United States and what has been done to a great extent in the medical and dental professions. No country, in this sense of the term, has ever completely "converted" to the metric system.

The categorization of responses into the three distinct levels is admittedly arbitrary since many degrees of response are possible for individuals and for firms, as well as for the Nation as a whole. But such groupings are convenient for a meaningful analysis.

### Classification of Industries

The first paragraph of the Metric Act instructs the Secretary of Commerce, among other things,

(a) "To determine the impact of increasing world-wide use of the metric system on the United States."

(b) "To appraise the desirability and practicability of increasing the use of metric weights and measures in the United States."

These statements clearly indicate that two basically different kinds of impact must be studied.

The first is the impact upon the United States; i.e., upon its people and industries arising from metric usage in other nations while we do not conform. This calls for a determination of the form "are we hurting enough, or likely to, to warrant Federal action?"

The second is the impact upon U.S. industries if they attempt to accommodate, adapt, or convert to metric measurement language or hardware—i.e., the cost if we in the United States attempt to increase our own use of the metric system in the hope of alleviating the impacts of the first kind.

For impact of the first kind, the study team is still gathering information and has not as yet developed the criteria for defining the magnitudes of the impact. For impacts of the second or responsive type more progress has been made.

The severity of the impact of externally increasing metric usage can vary greatly from one industry to another. Likewise the pattern of response to increased metric usage can vary. If the use of metric weights and measures in the United States were to be increased at a planned rate until those units become practically the only units in use, the whole gamut of response—accommodation, adaptation, and conversion—would be exhibited by various industries, and the responses would vary from one industry to another and would vary with the advancement of any transition.

Although industries can be studied individually, it is also necessary to take into account the effects of industries on one another through interindustry relationships. That is, one industry which would in itself experience no significant direct impact from increasing metric usage would have demands placed upon it by another industry where the impact may be considerable and the need to change is manifest.

The industries which would experience the greatest impact are those engaged in the manufacture of hardware items which must fit together precisely, while some industries would experience practically no impact from a general use of the metric system in the United States. Others, such as those engaged in real estate transactions and land titles, would find the benefits of change trivial as compared with costs of making it even if this were done over a very long period of time.

The study group is approaching the industry classification problem by grouping industries in five categories according to the severity of the impact of increased metric usage. These are:

1. Negligible, involves only accommodation, example—agriculture.



2. Slight, involves a mix of adaptation and accommodation, example—textile products.

3. Moderate, involves accommodation with some conversion, example—primary metals.

4. Substantial, involves widespread conversion, example—machine tools and transportation equipment.

5. Severe, involves disruptive conversion with no significant advantages, example—air transportation.

This classification requires some additional refinement. The Standard Industrial Classification Manual lists about 80 major groups of industries. Many of these industries would be so little affected by the metric trend that they need not be studied in great detail. On the other hand, major industries which would be strongly affected will require separate studies in greater detail.

The same classification will be useful in studying in detail the effect of metric usage in these industries on foreign trade. It will also simplify the analysis of cost of adaptation or conversion where either of these or mixes of them may be desirable.

A preliminary classification shows that those industries falling into categories 3 and 4 (moderate and substantial impact) contribute \$20 and \$65 billion, respectively, to the GNP, or a total of \$85 billion out of an overall total \$743 billion (1966 figures)—about 11 percent of the GNP. However, many of the industries in these categories might find it more advantageous to respond to increasing metric usage by either accommodation or adaptation, which are much less costly than conversion.

The preceding types of classifications will permit the utilization of a matrix approach to the study. Industries can be arranged by severity of impact and reactions to metric usage can be arranged by level of change. The study group anticipates that from such an approach it will be practicable to recommend a course of action that will provide near optimal advantage to the United States. This study approach should also yield valuable information to assist management decision-making in individual companies and in industry associations.

### **Metric Trends Among Some Industries**

Many industries and professions in the United States have exhibited strong trends toward acceptance of the metric system, particularly its modernized version, the International System of Units (SI). Scientists in the United States have accepted the metric system for many decades. The engineering professions use both the metric system and U.S. customary units depending upon the branch of engineering involved. Electrical and electronic engineers employ almost pure SI for their specialized fields, but usually use customary units for the hardware items with which they are involved. The medical and dental professions tend strongly to metric usage. These professional tendencies have a strong influence

on, and in turn are strongly influenced by, the practices of the industries with which they are associated.

Some industries such as the optical and photographic industries have been using a combination of metric and nonmetric units for several decades, partly because of European tradition.

The pharmaceutical industry converted to the metric system over a decade ago, because of its simplicity and the consequent economic benefits it affords. This decision to change was acceptable to users of its products, the physicians, because of their basic training in the metric system.

The antifriction bearing industry in the United States has operated for a long time with both metric and nonmetric products. Ball and parallel roller bearings are primarily metric products because they had their first development in Europe, but tapered roller bearings, having had their origin in the United States, developed as nonmetric products.

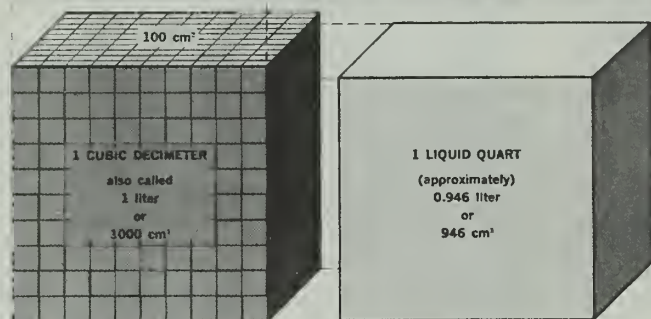
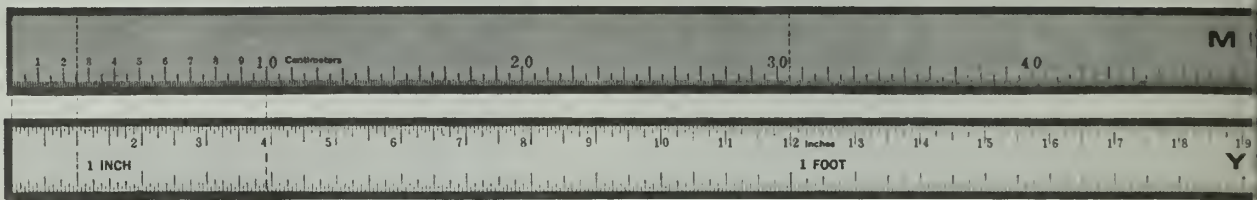
Since the problems faced by an industry are largely the sum total of those faced by the individual establishments in that industry, much understanding can be obtained by studying their individual problems. Many establishments which are involved in manufacturing recognize that in the next few years they must make important decisions on the course of action which they should pursue for their own economic advantage. This arises from a desire to have their products acceptable, both at home and abroad, and because many of them have foreign subsidiaries or foreign establishments which are making products that are the same or similar to products produced in the United States.

The question of repairability and replacement of parts of a piece of equipment are of great concern to a prospective customer. This requires that decisions be made by the manufacturer on whether the parts are to be held together by metric or nonmetric fasteners. If the product is sufficiently widely used that an effective service organization can be established with a large inventory of replacement parts locally available, use of metric or nonmetric components in the product is of minor consequence. If, however, repairs are to be made on the equipment from generally available supplies, the use of nonmetric parts could be a serious disadvantage to the product in a metric country.

Thus, one solution to the metric problem for those who wish to compete in metric markets would be increasing use of the metric system, not only in metric measurements, but also in wider acceptance of metric modules. In many cases, an adequate solution may be found simply by using metric dimensions, that is, expressing the size of inch-based modules in metric language. This alone would not appreciably remedy the difficulties encountered by many manufacturers.

Dual dimensioning can be used to ease over a transition period but it cannot be the ultimate solution to the metric problem. Dual dimensioning is the practice in

# The Modernized Metric System

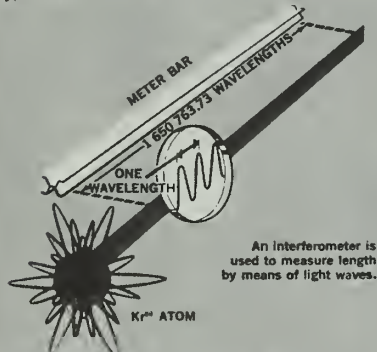


**T**HE International System of Units, abbreviated SI—is a modernized version of the metric system. It was established by international agreement to provide a logical and interconnecting system for all measurements in science, industry, and commerce. SI is built upon a foundation of base units and their definitions, which appear on this chart. All

## The Six Base Units of Measurement

### Length METER—m

The meter is defined as 1 650 763.73 wavelengths in vacuum of the orange-red line of the spectrum of krypton-86.



The SI unit of area is the square meter ( $m^2$ ). Land is often measured by the hectare (10 000 square meters, or approximately 2.5 acres).

The SI unit of volume is the cubic meter ( $m^3$ ). Fluid volume is often measured by the liter (0.001 cubic meter).



1968

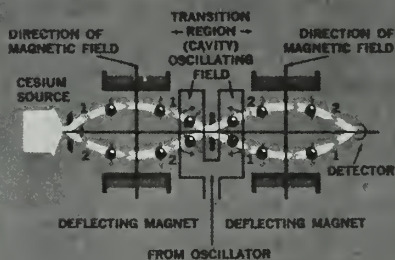
National Bureau of Standards Special Publication 304 A  
(Supersedes Miscellaneous Publication 232)  
For sale by the Superintendent of Documents, U.S. Government  
Printing Office, Washington, D.C. 20402 - Price 20 cents

#### References:

NBS Handbook 102, ASTM Metric Practice Guide, 40 cents  
NBS Misc. Publ. 247, Weights and Measures Standards of the  
United States, A Brief History, 35 cents  
NBS Misc. Publ. 286, Units of Weight and Measure, Definitions  
and Tables of Equivalents, \$1.50

### Time SECOND—s

The second is defined as the duration of 9 192 631 770 cycles of the radiation associated with a specified transition of the cesium atom. It is realized by tuning an oscillator to the resonance frequency of the cesium atoms as they pass through a system of magnets and a resonant cavity into a detector.



A schematic of an atomic beam spectrometer. The trajectories are drawn for those atoms whose magnetic moments are "flipped" in the transition region.

The number of periods or cycles per second is called frequency. The SI unit for frequency is the hertz (Hz). One hertz equals one cycle per second. Standard frequencies and correct time are broadcast from NBS stations WWV, WWVB, WWVH, and WWVL, and stations of the U.S. Navy.

Many shortwave receivers pick up WWV on frequencies of 2.5, 5, 10, 15, 20, and 25 megahertz. The standard radio broadcast band extends from 535 to 1605 kilohertz.

Dividing distance by time gives speed. The SI unit for speed is the meter per second (m/s), approximately 3 feet per second.

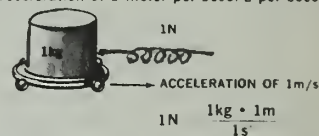
Rate of change in speed is called acceleration. The SI unit for acceleration is the meter per second per second ( $m/s^2$ ).

### Mass KILOGRAM—kg

The standard for the unit of mass, the kilogram, is a cylinder of platinum-iridium alloy kept by the International Bureau of Weights and Measures at Paris. A duplicate in the custody of the National Bureau of Standards serves as the mass standard for the United States. This is the only base unit still defined by an artifact.



Closely allied to the concept of mass is that of force. The SI unit of force is the newton (N). A force of 1 newton, when applied for 1 second, will give to a 1 kilogram mass a speed of 1 meter per second (an acceleration of 1 meter per second per second).



One newton equals approximately two tenths of a pound of force.

The weight of an object is the force exerted on it by gravity. Gravity gives a mass a downward acceleration of about  $9.8 m/s^2$ .

The SI unit for work and energy of any kind is the joule (J).

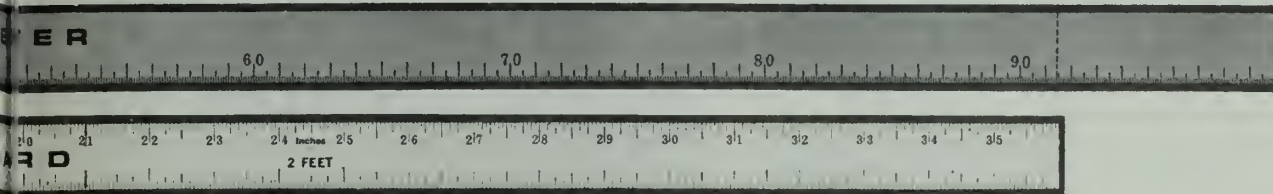
$$\begin{aligned} 1 \text{ J} &= 1 \text{ N} \cdot 1 \text{ m} \\ \text{The SI unit for power of any kind is the watt (W).} \\ 1 \text{ W} &= \frac{1 \text{ J}}{1 \text{ s}} \end{aligned}$$

This chart is one-third the actual size of the full-scale wall chart, NBS Special Publication 304, which is available.



# System The International System of Units (SI) and its relationship to U.S. customary units

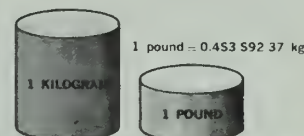
U.S. DEPARTMENT OF COMMERCE  
National Bureau of Standards



officially abbrevi-  
of the metric  
ational agree-  
ed framework  
nd commerce.  
and their defi-  
er SI units are

derived from these base units. Multiples and submultiples are expressed in a decimal system. Use of metric weights and measures was legalized in the United States in 1866, and our customary units of weights and measures are defined in terms of the meter and the kilogram. The only legal units for electricity and illumination in the United States are SI units.

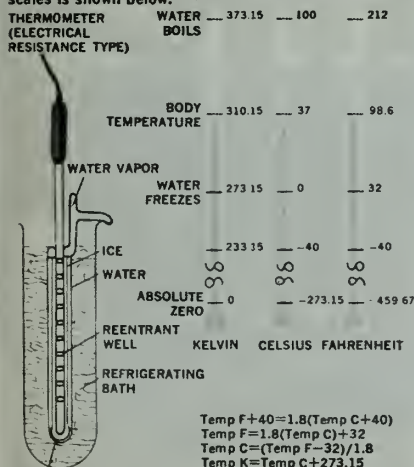
The kilogram shown here approximates one third the size of the platinum-iridium standard of mass. One pound of the same material would be three times the size shown below



## ment definitions, abbreviations, and some SI units derived from them

### KELVIN-K

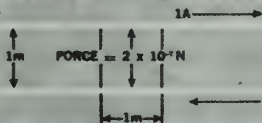
The thermodynamic or Kelvin scale of temperature used in SI has its origin or zero point at absolute zero and has a fixed point at the triple point of water defined as 273.16 kelvins. The Celsius scale is derived from the Kelvin scale. The triple point is defined as 0.01 °C on the Celsius scale, which is approximately 32.02 °F on the Fahrenheit scale. The relationship of the Kelvin, Celsius, and Fahrenheit temperature scales is shown below.



The triple point cell, an evacuated glass cylinder filled with pure water, is used to define a known fixed temperature. When the cell is cooled until a mantle of ice forms around the reentrant well, the temperature at the interface of solid, liquid, and vapor is 0.01 °C. Thermometers to be calibrated are placed in the reentrant well.

### AMPERE-A

The ampere is defined as the magnitude of the current that, when flowing through each of two long parallel wires separated by one meter in free space, results in a force between the two wires (due to their magnetic fields) of  $2 \times 10^{-7}$  newton for each meter of length.



The SI unit of voltage is the volt (V).

$$1V = \frac{1W}{1A}$$

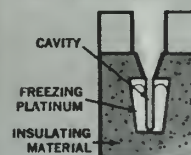
The SI unit of electrical resistance is the ohm ( $\Omega$ ).

$$1\Omega = \frac{1V}{1A}$$

### CANDELA-cd

The candela is defined as the luminous intensity of  $1/600\,000$  of a square meter of a radiating cavity at the temperature of freezing platinum (2042 K).

LIGHT EMITTED HERE



The SI unit of light flux is the lumen (lm). A source having an intensity of 1 candela in all directions radiates a light flux of 4 $\pi$  lumens.

A 100-watt light bulb emits about 1700 lumens

### COMMON EQUIVALENTS AND CONVERSIONS

Approximate Common Equivalents	Conversions Accurate to Parts Per Million
1 inch	25.4 millimeters
1 foot	0.3048 meters
1 yard	0.9144 meters
1 mile	1.60934 kilometers
1 square inch	6.4516 square centimeters
1 square foot	0.092903 square meters
1 square yard	0.836127 square meters
1 acre	0.404686 hectares
1 cubic inch	16.3871 cubic centimeters
1 cubic foot	0.0283168 cubic meters
1 cubic yard	0.764555 cubic meters
1 quart (liq)	0.946353 liters
1 gallon	3.78541 liters
1 ounce (avdp)	28.3495 grams
1 pound (avdp)	4.53592 kilograms
1 horsepower	0.745700 kilowatts
1 millimeter	0.0393701 inches
1 meter	3.28084 feet
1 kilometer	0.621371 miles
1 sq. centimeter	0.155 square inches
1 square meter	10.7639 square feet
1 hectare	2.471 acres
1 cu. centimeter	0.0610237 cu. inches
1 cubic meter	35.2335 cubic feet
1 cubic meter	1.35 cubic yards
1 liter	1.05669 quarts (liq)
1 cubic meter	264.172 gallons
1 gram	0.035274 ounces (avdp)
1 kilogram	2.20462 pounds (avdp)
1 kilowatt	1.34102 horsepower

+ common term not used in SI

\* exact

### THESE PREFIXES MAY BE APPLIED TO ALL SI UNITS

Multiples and Submultiples	Prefixes	Symbols
1 000 000 000 000 = 10 <sup>12</sup>	tera (ter'a)	T
1 000 000 000 = 10 <sup>9</sup>	giga (ji' ga)	G
1 000 000 = 10 <sup>6</sup>	mega (meg'a)	M
1000 = 10 <sup>3</sup>	kilo (kil'o)	k
100 = 10 <sup>2</sup>	hecto (hek'to)	h
10 = 10 <sup>1</sup>	deka (dek'a)	da
1 = 10 <sup>0</sup>	deci (des'i)	d
0.1 = 10 <sup>-1</sup>	centi (sen'ti)	c
0.01 = 10 <sup>-2</sup>	milli (mil'i)	m
0.001 = 10 <sup>-3</sup>	micro (mi' krō)	μ
0.000 000 001 = 10 <sup>-9</sup>	nano (nan'ō)	n
0.000 000 000 001 = 10 <sup>-12</sup>	pico (pē' kō)	p
0.000 000 000 000 001 = 10 <sup>-15</sup>	femto (fem'tō)	f
0.000 000 000 000 000 001 = 10 <sup>-18</sup>	atto (at'tō)	a

\*Most commonly used

drafting of indicating the size of a part in both metric and customary units so that it can be fabricated equally well in either a metric shop or a nonmetric shop, or with either metric or nonmetric equipment in a shop having dual capability. In order to assure compatibility between parts made from dual dimensioned drawings, closer tolerances are usually set when the dimensions are translated from one system of measurement to another. This results in an increased cost when the part is to be manufactured according to the translated dimensions.

### Other Factors

The study now in process must also consider factors other than the industrial, economic, and trade problems discussed above. As previously mentioned, the military problem will be explored separately but not independently and the results must be integrated with the final conclusions of the study. In addition the problem of educating the public to a greater understanding of the metric system must enter the overall evaluation. A final and by no means insignificant factor is the impact of the metric problem on the U.S. role as a leader in international affairs. Many people feel that the U.S. role as a world leader is jeopardized by our adherence to an isolated system of weights and measures. It has overtones of a theme that everyone is out of step but us.

While the United States, as a nation, may find it awkward to be frowned upon as the sole holdout against the obvious advantages of the SI system, the domestic and international consequences of any contemplated change in SI usage must be carefully considered and

weighed against the claimed (and even the unpublished) advantages.

This places two fundamental requirements upon the study:

a. The factfinding related to all important advantages and disadvantages of the alternative courses of action must be objective, impartial, and unemotional.

b. Value judgments between conflicting criteria or national objectives must be reached openly in the political forum with opportunity for all to be heard.

Delegation of responsibility for the study to NBS, a predominantly technically based organization intimately involved with measurement and standards problems on all fronts may appear to be in conflict with requirement (a). Meeting the requirement of objectivity is in this case a type of management problem which NBS has historically shown it can solve. There seems little doubt it can do so again.

An additional management problem grows out of the complexity of the study problem, which leads into areas requiring talents not available at NBS or, in fact, beyond those available in any single organization. This has been clearly recognized and carefully considered both in making the delegation to NBS and by NBS itself. An important portion of the initial study effort has been devoted to arrangements for bringing the necessary skills and knowledge to bear upon the problem.

The authorization act for the metric study has specific language insuring that requirement (b) must be given proper attention. The study is being carefully planned with these expressed wishes of the Congress in mind. □

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### CHEMICALS TIGHTEN IMPELLER FIT



During recent repair work on the U.S.S. *Coral Sea* (CVA-43) at San Francisco Bay Naval Shipyard, impellers on the main feed pumps were found to be loose on the shafts. Substance composition of the impellers prevented their being welded or silver brazed. Manufacture of new impeller castings or machining the castings appeared to be the alternatives until Shop 31 decided to use a new chemical repair method to build up

the bore (center) of the impellers. Metal was chemically deposited in the impeller bore, thus utilizing the existing casting and correcting the impeller fit.

In addition to fiscal year 1969 savings of \$37,000 resulting from the use of this chemical method on seven vessels and fiscal year 1970 estimated savings of \$30,000, shop procedures have been changed to reflect the new method on all applicable feed pump repairs.



## *Rate-Setting Evolution—*

# DEFENSE AND THE FEDERAL COMMUNICATIONS COMMISSION

**T**O UNDERSTAND the relationship that exists between the Department of Defense and the Federal Communications Commission it is necessary to look at the historical roots of Federal regulation of private industry in general and the background of the Federal Communications Commission in particular. It is also necessary to recognize the increased importance of communications to the defense effort, the rapidly expanding defense requirements for communications services and facilities, and the concomitant increased interest of the Department of Defense in the regulation of the communications industry.

### **Regulation Protects Public**

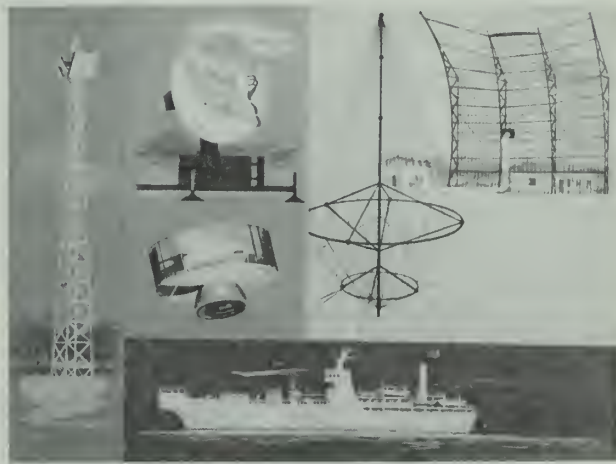
In 1820 Congress conferred upon the city of Washington the power "to regulate the rates of wharfage and the sweeping of chimneys." Although this power of regulation bears little resemblance to the type of regulatory powers wielded by Federal commissions over various segments of industry today, this brief flashback into history does indicate that Federal regulation of private enterprise is nothing new. Regulation is America's way of assuring that the public gets adequate amounts at reasonable rates of those services which are essential to the existence of our economy. Government agencies like the Federal Communications Commission were created not to operate the industry but to regulate it in the public interest. It might be stated that public utility companies are required to accept regulation in exchange for their monopoly status. It should be noted that the regulatory agencies in this country are charged with maintaining sound communications, power, and transportation systems as well as protecting the public.

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**By HAROLD W. GRANT,**

*Lieutenant General, USAF (Ret.),  
Director for Telecommunications Policy,  
Office of the Assistant Secretary of  
Defense for Installations and Logistics*

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Referring to what he called "the regulatory agencies," President John F. Kennedy said in a message to Congress on 13 April 1961: "The responsibilities with which they have been entrusted permeate every sphere and almost every activity of our national life. Whether it be transportation, communications, the development of our national resources, the handling of labor-management relationships—to take only a few examples—these agencies and their performance have a profound effect upon the direction and pace of our economic growth."

### **Evaluation From Legislature to Commission**

Regulation began because of a desire to set up some form of legal control over the operation of so-called natural monopolies engaged in very essential forms of public service. It started out as regulation of essential public services by legislatures under statutes primarily concerned with adequacy of service and avoidance of preference or discrimination. As a matter of fact, the regulatory process exercised by the various agencies today is a legislative rather than a judicial function.

Obviously, with changing conditions, the early type of direct regulation by legislatures inevitably broke down. It was inflexible, needed regulation, was slow in being approved, and the system became unworkable. Law had to be amended as economic conditions

changed and modern technology developed. Continuous regulation was impossible because legislatures held sessions at only certain times during the year. These same legislators also lacked specialized knowledge of regulatory problems and expertise in the fields as technological improvements occurred. In addition, the increasing burden of other legislative duties and the growth in the number of utilities made it increasingly cumbersome for legislative bodies to effectively exercise regulation, capable of adapting to an increasingly complex society and for safeguarding the interest of both consumers and the utility companies.

### Rise of the Administrative Process

In essence, the administrative process in this country is Congress delegating its authority to regulate commerce to various agencies which have special expertise in the particular field and procedures to make speedy determinations. In the early days when the administrative agencies were being formed the concept was not to think in terms of judiciary versus bureaucracy, capitalism versus socialism, or laissez faire versus governmental interference. Instead, the early agencies were created because practical men were seeking practical answers to immediate problems. The same approach was dominant in 1887 when the Interstate Commerce Commission, the first great regulatory agency, was created. As an example, in 1916 Elihu Root, in an address as President of the American Bar Association, stated: ". . . such agencies furnish protection to rights and obstacles to wrongdoing which under our new social and industrial conditions cannot be practically accomplished by the old and simple procedure of legislatures and courts as in the last generation." At the same time he uttered important words of caution: "If we are to continue a government of limited powers, these agencies of regulation must themselves be regulated . . ." So it was, at this early date, that men realized what was needed was a governmental authority having power not merely to adjudicate but to initiate proceedings, to investigate, to prosecute, to issue regulations having force of law, to supervise.

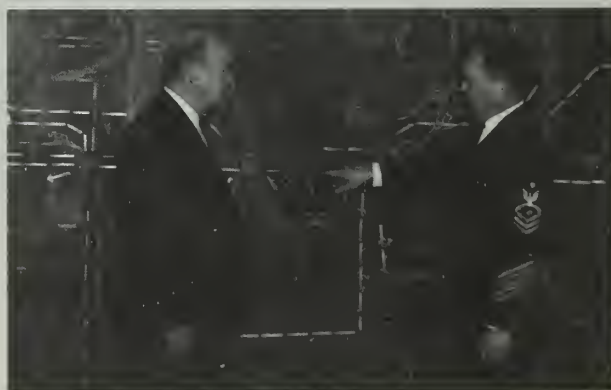
The resort to regulation by administrative agencies of other utilities—electricity, gas, water, telecommunications, airplanes, to name a few—soon followed. For public utility-type enterprises some degree of monopoly is usually essential, but experience quickly proved that unregulated monopoly was intolerable. Concomitant with this process was the concept that the legislative process and the judicial, which are the principal alternatives to the administrative process, frequently fall short of providing what is needed. A legislative body is at its best in determining the direction of major policy, and in checking and supervising administration. Gradually the legislative bodies developed the system of legislating only the main outlines of programs requiring constant attention, and delegating to administrative agencies the

tasks of working out subsidiary policies. The system facilitated not merely the promulgation of law through rules and regulations but the correlation of rulemaking with such other necessary activities as adjudication, investigating, prosecuting, and supervising.

### The Legislation

The Communications Act of 1934 brought under the authority of the Federal Communications Commission regulatory powers formerly dispersed among several agencies—broadcast regulatory functions previously exercised by the Federal Radio Commission (which was abolished by the Communications Act of 1934); supervision of certain telegraph and telephone operations formerly under the jurisdiction of the Interstate Commerce Commission; jurisdiction over Government telegraph rates which had been under the Post Office Department; and some powers of the Department of State with respect to cable landing licenses. The Communications Act of 1934 also charged the FCC with the supervision of rates of interstate and international common carriers and the domestic administration of international agreements relating to electrical communication generally. In short, the objectives of the Communications Act of 1934 were to regulate interstate and foreign wire and radio communication, further the national defense, promote the safety of life and property, and provide effective execution of these policies. A recent addition, the Communications Satellite Act of 1962, vested the FCC with regulatory jurisdiction over satellite space communication service.

Preliminary to an enlightened approach to the business-and-government problem(s) in telecommunications is a clear statement of the reason for any government regulation whatever. Why, for instance, should radio be regulated any more than the press or the cinema is regulated? The answer is simply that radio frequencies are essential to the conduct of our economy and have a public utility status. For example, in the radio medium it is axiomatic that the airwaves and fre-



*The author listens as Senior Chief Petty Officer Bosse explains the system status of the Defense Communications System.*



quencies belong to the people. No one with a radio-transmitter may trespass on it with song or speech unless the people's government—in the form of the FCC as we know it today—grants permission. That permission specifies, among other things, the power of the transmitter, the exact slice of air it shall cleave, and the times during which it may operate. On such a legal foundation is the business of commercial broadcasting based. It has always been thus in the radio industry.

That is, nearly always. For 8 chaotic months, from July 1926 through February 1927, there was no regulating agency and virtually no broadcasting law. A court had ruled that the Secretary of Commerce, Mr. Herbert Hoover, did not have the power to regulate broadcasting stations as he had assumed. Following this decision, stations began to broadcast on any channel at any power from any place they chose. Hundreds of new stations emerged almost overnight crowding the air; others raised their power or "jumped" to more favorable channels. The ether was jammed completely with unintelligible sounds, listeners put down their headphones and went back to phonograph music, and sales of radios dropped. Against this background a unique spectacle took place: An American industry, a young industry with a future, went to Congress and begged for regulation. It got it—eventually in the form of regulation as we know it today, the FCC. But what began as only an engineering problem, is besieged today with considerations in the social, political, and military arenas.

### **DoD as a Customer**

Today a somewhat anomalous situation has developed. Historically, the FCC, which was established to regulate the communications industry, now must also protect a major part of the Federal Government—the Department of Defense, which has become one of the largest customers for commercial communications. As a large customer it has a vital interest in the rates charged for communications services and in communications service adequate to meet its needs. To understand this situation we also should consider the reasons which have led the Department of Defense to become such a large customer of the commercial communication interests.

First of all, there has been a very great increase in the need for the exchange of information, or communication within the Defense establishment. The fundamental reason for this is the change in the nature of warfare itself and its emphasis on the intense compression of time. Time itself is now one of the prime considerations of warfare. In the past a commander might have had days and months to react; today's commander must react in seconds; furthermore, his reaction must be based on a much broader informational base. The key to this sequence of events and actions is communication.

In addition to the requirement for command and control, in which time plays such an important role, there are also other influences increasing the military appetite for communications. There is the need for large information bases to manage what has become major logistical efforts, equaling in size our largest national industrial enterprises, sensitive intelligence requirements, and other management centralizations and improvements such as centralized finance, centralized personnel management, and centralized supply. All of these developments are possible only through the increased use of communications.

In meeting this huge requirement for communications Defense leaders considered various alternatives. One alternative, of course, was to build the necessary communications capability and operate it as a Department of Defense asset. This in fact is done in many overseas areas where military necessity as well as the absence of commercial facilities indicates the desirability of this course. Within the United States and also in certain other well-developed areas, the presence of a highly developed commercial communications industry made the procurement and operations of an organic Defense system unrealistic. Thus, there has developed a reliance and partnership between the DoD and the American telecommunications industry. This partnership has had far-reaching benefits and advantages for both sides. Despite such advantages, however, it has been necessary for Defense, as a customer, to be fully aware of the commercial interests of industry.

The awareness and interest in attempting to obtain the best commercial arrangements for DoD is a story that should be pleasing to the American taxpayer. Part of that story is the fairly recently developed intercourse which the Department of Defense has undertaken with the FCC. This intercourse is the method whereby Defense, as a major customer, presents its case as any other customer, to the FCC in an effort to obtain for the DoD relief from practices it considers to be unreasonable and unlawful. The remainder of this article concerns one such major incident.

### **Telpak Tariffs**

Prior to 1961 DoD procured private commercial communications services under individual tariff rates or, in some instances, under "bulk rates" offerings commonly known as multiple channel tariff rates. These latter rates offered a very modest reduction of cost in limited instances. In January 1961 the Bell Co. filed a tariff covering a new service offering known as TELPAK. TELPAK was intended to meet the requirements of volume point-to-point communications. The TELPAK tariff was designed to sell private commercial communications services on a package basis at "bulk rates." The TELPAK tariff offered the customer bandwidth which could be used for telephone, teletypewriter, telephotograph, data, etc. TELPAK per-

mitted theoretical routing of groups of circuits which reduced the cost of service to large customers, such as DoD. To illustrate this point, the estimated savings to the Government as a result of utilizing TELPAK service from fiscal year 1963 through fiscal year 1967 was \$279,492,162. (See table on p. 39 for TELPAK growth.)

### **Low Rates Assailed**

In March 1961 the TELPAK rates were attacked by Western Union on the grounds that they were unreasonably low, designed to stifle Western Union service, and discriminatory. The FCC entered into an investigation which ended with an FCC order on 9 November 1966 finding TELPAK A and B rates to be unlawful and directing that TELPAK C and D rates be tested as to reasonableness in the pending FCC investigation of A.T. & T., docket 16258.

On 1 February 1968, without waiting for a determination as to the reasonableness of existing TELPAK C and D rates in docket 16258, A. T. & T. filed with the FCC proposed increases for its TELPAK services (C and D) to be effective on 1 April 1968. According to A. T. & T. the proposed increases amounted to approximately 93 percent. Upon review in OSD of the A. T. & T. proposed increases in TELPAK C and D rates, it was determined that they would increase the cost to the Executive Agencies for TELPAK services by more than \$70 million annually; that the Executive Agencies did not have funds available to meet the \$70 million annual increase required by the proposed rates; that this amount would require new Congressional appropriations which could not possibly be obtained by the proposed 1 April 1968 effective date of the tariff increase; and that the only alternative to a rejection of the filing by the FCC or a withdrawal of the proposed increases by A. T. & T. would be a drastic cutback in the amount of vital communications at the expense of national security.

A. T. & T. recognized the possibility of a cutback in defense communications and advised the FCC that the government would have to cutback at least 36 percent of its communications. A. T. & T. stated that this estimated cutback took into consideration the maximum use by DoD of all available Government-owned microwave facilities.

Even such a cutback would not have solved the fiscal year 1968 problem of lack of funds because of the large termination liabilities of the Federal Government. Furthermore, from a long-range viewpoint, the basic design of the major defense communications systems with their survivability and redundancy features was predicated on the relatively inexpensive bulk rates for the leased communications circuits comprising the CONUS central hub of these worldwide systems. The trend to future lower costs for circuitry through the continuing technical advancement in transmission media was a major consideration in the overall design

of the systems. Redesign of these systems, now well on the way to full implementation, to fit within acceptable costs under the proposed rates would not be feasible. It would result in systems with reduced survivability and inadequate to meet the requirements for national defense.

### **DoD Intervenes in Rate Proceedings**

In view of the extreme seriousness of the proposed A.T. & T. increase, and the OASD (I. & L.) belief that the proposed new rates were exorbitant, unreasonable, and unlawful, OASD(I. & L.) took emergency and intensified management action to prevent the A.T. & T.-proposed increase from taking effect on 1 April 1968. Accordingly, memorandums were sent to GSA, the Agency charged with representing the Federal Government in communications rate proceedings, pointing out the serious impact of the proposed rate increases on the Government as a whole and particularly on DoD. In view of the predominant impact on the Department of Defense, it was proposed that special authority be granted to the Secretary of Defense to represent not only the DoD but all of the Executive Agencies of the Federal Government before the FCC in the TELPAK C and D matter.

In response to these appeals, the Administrator of General Services, Mr. Lawson B. Knott, Jr., delegated authority on 20 February 1968 to the Secretary of Defense to represent the interests of all the Executive Agencies of the Federal Government before the Federal Communications Commission.

In order that the Department of Defense might present the best possible case to the FCC, an ad hoc committee of experts was formed with representatives from Army, Navy, Air Force, DCA, Office of the Secretary of Defense, Federal Aviation Agency, Department of Transportation, and General Services Administration to formulate the Federal Government's position, plan the attack on the rates, and assist DoD trial counsel. Numerous meetings were held with members of the FCC, its staff, other large customers, and A.T. & T. in developing the Government position and attack.

On 1 March 1968 the Secretary of Defense submitted to the FCC on behalf of all Executive Agencies of the United States a petition to reject or require withdrawal of the A.T. & T.-proposed increases in TELPAK rates. The petition stated that failure to reject the filing or to cause A.T. & T. to withdraw its proposed increases in TELPAK rates was "clearly contrary to the public interest, since it would seriously and detrimentally affect the defense effort and the national security."

### **Increase Would Cost Defense \$18.4 Million Annually**

After this petition was filed with the FCC, A.T. & T. withdrew the TELPAK increases scheduled to take ef-



fect on 1 April 1968. However, on 25 March 1968 A.T. & T. again filed proposed increases in TELPAK rates for a lesser increase to take effect on 1 June 1968. A.T. & T. reiterated its position that the original rate increase was valid but proposed the new revisions as an intermediate step.

The Department of Defense continued its intensive effort to prevent this increase. It therefore filed another petition on 2 April 1968 on behalf of the Department of Defense and all other Executive Agencies requesting suspension and investigation of the revised TELPAK increases. In addition, it requested the Commission to direct A.T. & T. to keep accurate accounts of amounts received under the revised tariff should the investigation not be completed during the suspension period and to make refunds to customers should the charges not be found justified at the conclusion of the investigation.

The petition pointed out that the U.S. Government is by far the single largest user of TELPAK service and that the increased rates would cost the Department of Defense alone an additional \$1,536,000 per month (\$18,432,000 per year). The petition insisted that the increase is "clearly unconscionable" and "unjust, unreasonable, and otherwise unlawful." The petition also stated that the proposed increases would be "directly contrary to the public and national defense interests," "extremely detrimental to the national security," and "place an undue and clearly unjust burden on the ratepayer."

After review of the Department of Defense petition, the FCC entered an order on 10 April 1968 which suspended the effective date of the proposed TELPAK rate increases from 1 June to 1 September 1968. Pending receipt of additional data and further investigation, the FCC acknowledged that it was unable to determine that the proposed increases were "just and reasonable or otherwise lawful."

#### *Defense participation in TELPAK service reflecting decreasing costs for miles serviced*

	Miles	Monthly Cost
January 1963.....	3, 227, 790	\$1, 372, 385. 00
January 1965.....	8, 843, 494	2, 245, 089. 00
January 1967.....	12, 782, 061	2, 873, 703. 59
January 1968.....	13, 319, 028	2, 904, 113. 14
August 31, 1968.....	13, 232, 553	3, 055, 043. 67

#### **Relationships Now Established**

The Department of Defense is continuing its intensified effort to oppose these exorbitant proposed increases. Considerable success and dramatic savings (over \$46 million through fiscal year 1969) have resulted from this effort.

Perhaps more important from a long-range viewpoint is the establishment of a direct relationship and the development of expertise for future actions with the FCC when vital defense matters are concerned. This direct relationship with the FCC and indirectly with the U.S. communications industry is an empirical development that the founders of our federal regulatory processes hardly could have foreseen. It is again a practical result forged in rapidly changing circumstances by practical men in industry and government.

The representation and appearance by a Government agency (DoD) before another Government agency (FCC) concerning its customer interest in the commercial costs of services purchased from private industry is a purely American paradox. The continual evolution of this paradoxical, but practical, working arrangement will require continued close surveillance by DoD of all new rate filings and service offerings by the communications common carriers, a close relationship with the FCC, and the good will of the industry. □

## **HAWAII VOICE CIRCUIT CHARGES REDUCED**

The Defense Communications Agency reports that some \$4.4 million was saved from October 1966–December 1968 in reduced recurring monthly charges for voice circuits between Continental United States (CONUS) and Hawaii.

The Defense Commercial Communications Office (DECCO), Scott Air Force Base, Bellville, Ill., in its quarterly report, said that percentagewise, overall reductions for these CONUS-Hawaii circuits was 50.4 percent per circuit for the period October 1, 1966, to November 1, 1968.

Additional reduction of \$42,750 in costs were realized in other areas also: CONUS to Bermuda—\$15,000 (effective 1 Aug. 1968); CONUS to Panama—\$10,000 (effective 8 Apr. 1968). The rate to Panama has been further reduced, provisionally, to \$7,750 per month.

When effective, another \$25,000 of monthly savings will be realized. CONUS to Puerto Rico—\$17,750 (effective 1 Aug. 1968).

The cumulative savings from the above reduction in the Caribbean and Bermuda amount to \$243,800 through December 31, 1968. None of the reductions have been in effect for as much as a year. The annual rate of savings will be \$513,000.

Col. Seymour Stearns, USAF, is Chief of DECCO, which is responsible for leasing and fund management for all Department of Defense Commercial Communications originating in CONUS. DECCO is responsible also for leasing Federal Aviation Agency requirements in the United States. DECCO has a field office (DECCO-PACIFIC) in Honolulu for leasing services in Hawaii.

# BUDGETING BY OUTPUT

## *So You Want Money! For What?*

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By LT. COL. VINCENT J. KLAUS, USA

*Systems Analyst  
Office of the Secretary of  
Defense (Comptroller)*

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MOST PARENTS have at one time or another been approached by members of the family with a request for additional funds. The usual response is, "For What?" The same question can be identified in a DoD memorandum on financial management improvements dated March 3, 1967. In this memorandum the Secretary of Defense emphasized the importance of improving output information within the department. The Secretary was asking "For What?" in a past, present, and future sense.

Actions following the memorandum included the establishment of an Output Measurement Systems Directorate within the Office of the Assistant Secretary of Defense (Comptroller) and the publication of a Department of Defense Directive, No. 7000.4, entitled "Output Measurement System," dated April 13, 1968.

This Directive establishes policy and assigns responsibilities for the development of an output measurement systems program. The program is a challenging one that incorporates new and old concepts of management analysis. Its objective is to ascertain the func-

tions, tasks, or missions performed by DoD organizations during a given period of time. Using a unit's performance or output as a basis for analysis is hardly a new concept. The designations of many of our military units describe their primary function and reflect their output; i.e., an Engineer Float Bridge Company, Ordnance Tire Repair Company, Transportation Light Truck Company, etc. Task Force formation is based on the expected outputs of the units assigned and upon the quantity of such outputs.

The use of output as a basis for managerial functions cannot be construed as a child of Federal bureaucracy. Frederick Taylor, considered the founder of American Managerial Science, recommended operations be evaluated on the basis of output as opposed to resources consumed: men were to be paid not for hours on the job but for items of work accomplished to specification; i.e., piecework that passed inspection. Supervisory personnel were to be evaluated on the number of products produced from a plant rather than on the value or extent of the area of responsibility. Measures of efficiency or output are used today for evaluation in the commercial world, especially where activities are so distant from the final profit and loss computations that their output cannot readily be identified in the profit picture.

Output measures have found their way into military management and are frequently applied to military logistical units. They appear under a variety of designations, such as performance factors or work units. A good sampling can be obtained from AR 37-100-69

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*"Output information or productivity measurement has a significant role to play in the efficient utilization of resources by the Government. No other area of Federal management offers as much opportunity for improvement."*

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"The Army Management Structure" and Marine Corps Order 7310.40B, "Uniform Chart of Cost Accounts for Marine Corps Activities." Most of the measures now in use are valid reflections of production; however, two general comments should be made about them.

First, in a few cases, the measure reports resource consumption rather than production achieved. For example, the unit "man-hours worked" is an input and cannot validly be used to justify a budget. The most inefficient unit can justify its payroll in this fashion. In effect, its budget estimate states "We used our funds efficiently last year (since we spent all of them) and therefore need as much or more this year." On the other hand, if the term "earned hours" is used and based on engineered standards, a valid performance measure can be evolved by comparing hours earned with the payroll hours.

The second comment that applies to a few of the measures is that more than one measure is applied to the same cost account. This practice requires the analyst to accomplish careful weighting of each single measure to produce a composite which is sensitive to changes in cost and reflects performance by a single quantity. Without a composite (if the mix of output measures is not weighted), any change in the output mix invalidates the established relationship between the single-cost figure and the mixed results of performance. Trend analysis and other managerial use of the data become almost impossible.

An alternative approach to this multiple output measure problem is to break down the cost figure until each cost account is matched by a single measure. However, this may be impossible without artificial prorating of costs which results in a perspective as invalid as the multiple measures originally provided.

Use of output measures for logistical measurement is the old and accepted portion of the DoD program to improve output information. Progress in this area is expected in developing better measures and in wider utilization of the improved measures in the Planning-

Programing-Budget System used at the highest levels of Defense management.

As was mentioned earlier, the output measurement program incorporated new concepts of output information as well as the old and accepted ones discussed above. The new and more challenging portion of the program deals with the output of combat and combat support units. In this area we find that output is frequently a combination of work actually performed and of capabilities maintained. Certainly, a degree of capability is maintained in military logistical units, i.e., a capability to expand production in quantity or to expand operations to include a different sort of production. However, in combat and combat support units the amount of resources consumed to maintain capabilities rises to a dominant position. A missile squadron's major output is the maintenance of a capability to launch under prescribed conditions. To insure valid output data regarding the maintenance of capabilities, as well as actual performance, several requirements must first be met:

1. All the expected (designed) outputs of the organization must be clearly defined and documented. The outputs being measured must be the end products of the organization; i.e., goods, services, or capabilities to produce goods or services, for use outside of the unit, not for use within the organization itself. For example, the number of meals served by a mess section is the output of that section but must not be measured as the output of a battalion except insofar as the mess section feeds more than personnel organic to the battalion. Care must be taken to avoid overlapping or duplication of output measures. Documentation of these outputs will assist commanders at all levels to know precisely what capabilities are (or are not) being maintained and what criteria are used to evaluate them.

2. The output must be expressed in homogenous units of a consistent content; i.e., if more than one measure is to be matched with an expense, a single

composite must be developed and the method of calculation standardized.

3. A means of matching the output of the organization with the expenses accrued in production of that output must be developed. If this is not accomplished, many significant cost/output relationships will be lost and it follows that opportunities to redirect resources to improve the organization's production will also be lost.

There are in use today measures of capability in the form of tests, exercises, and maneuvers, but these measures of capability do not lend themselves to managerial analysis. In its present form this information presents the analyst with serious obstacles in addition to an absence of the characteristics just described. Some examples of these obstacles are:

1. Information is often recorded in narrative form and scattered throughout the report. This forces the retrieval and the sorting of information by slow manual research.

2. It is difficult, and in some cases impossible, to determine what information exists, and where it can be found.

3. The information is often in highly classified form, requiring careful extraction of unclassified data.

4. The information is impossible to relate accurately to resource consumption.

It appears appropriate at this point to examine the uses of output information within DoD. An exhaustive study is neither available nor in the making. However, a few areas of use can be examined as representative of the uses envisioned for the measures established by the DoD Program.

### Cost/Effectiveness Studies

A major portion of DoD outlays is justified on the basis of cost/effectiveness studies. The input or cost portions of the equation reflect soundly based estimates and careful manipulation of a multitude of factors. However, the effectiveness or output side of the equation occasionally suffers from generalized, or nonstandard terms.

It is axiomatic that the result of a mathematical manipulation cannot reflect a greater accuracy than that shown by the least accurate of the input data. Accordingly the effort invested in perfecting DoD cost/effectiveness studies appears to be invalidated by the absence of accurate, standardized measures of output. Detailed forecasts of expense can be validly used for the decision making process only if an equally accurate measure of the outputs is also used. Decisions as to force mixes, or of weapon system trade-offs are only as valid as the measurement of their effectiveness. Until a complete and accurate statement of what is to be produced is available for cost/effectiveness studies, the equations will remain vulnerable to criticism.



*"What's the matter with our quarterly report?"*

### Analysis at the Organizational Level

Stabilized and validated output measures will permit the local commander to:

- Accumulate cost and performance data over a period of time for trend analysis.
- Demonstrate, without equivocation, improvements in production with consistent relationship to costs.
- State precisely what additional resources would be needed to produce a specific change in output.

Improved output information will assist the commander in many other areas as well, since the better a commander's sources of information, and the sounder his analytical procedures, the more effective will be his recommendations and requests to his superiors.

### Cost Comparisons

Where standardized output measures are available, comparisons of output costs between organizations of the same Service or on an inter-Service basis become possible. It may be necessary to maintain an organization in an expensive environment for reasons that appear to justify the high cost of production. However, with improved output measures, managers will know how much they are paying above the norm for each type of output and thus can more intelligently decide whether the cost justifies the advantage of a location for each output. Or again, one Service may have negotiated a favorable contract with civilian industry that exploits the economies of scale. By demonstrating this economy with the use of standard output measures a DoD-wide exploitation may be possible.

This discussion may appear basic but the size and complexity of DoD operations make such cost comparisons virtually impossible without standard measures of



output. At a minimum, a simplification of the process involved in cost comparisons is promised by standardization of output measures.

### Planning-Programing-Budgeting System

The Planning-Programing-Budgeting System as promulgated by the Bureau of the Budget has had a far-reaching impact on DoD procedures. Perhaps the best description of this system is available in BoB Bulletin 68-9, "Planning-Programing-Budgeting (PPB) System," dated April 12, 1968. The bulletin repeatedly refers to output as a major deciding factor in organization of the system:

"The Program and Financial Plan is a comprehensive multiyear summary of agency programs in terms of their outputs, costs, and financing needs . . ."

"A program element covers agency activities related directly to the production of a discrete agency output, or group of related outputs."

"Program elements have these characteristics:

"(1) they should produce clearly definable outputs, which are quantified wherever possible; (2) wherever feasible, the output of a program element should be an agency end-product—not an intermediate product that supports another element; and (3) the inputs of a program element should vary with changes in the level of output, but not necessarily proportionally."

The Planning-Programing-Budgeting System relies heavily on output information and in light of its far-reaching influence in Federal budgets, it can be reasoned that improved output information will facilitate DoD financial operations. Improved output information should enhance the success of such proposals as budgets and program change requests.

### Contingency Planning

Improved output information is required for contingency planning and for reaction to emergency situations.

USSTRIKECOM recognized this need in a revision to its Operation Plan 581 (OPLAN 581) which documents the output of Army and Air Force units. The OPLAN is designed as an aid to planners in developing force requirements to support contingency and augmentation plans. It provides a means for rapid selection and tailoring for predesigned forces by:

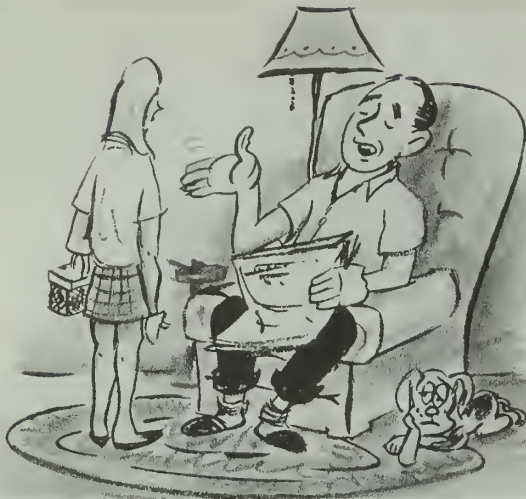
- Organizing Army and Air Force units into balanced combinations of combat and support units called Force Packages.
- Including selected Army and Air Force units of various sizes and types, capable of providing additional force or specialized capabilities, as Augmentation Blocks. These Augmentation Blocks can be used to tailor a Force Package to the environment or to a special mission.



The OPLAN includes a Capabilities Check list for each of the force units appearing in the Force Packages or in the Augmentation Blocks. The Capabilities checklists were prepared by the Component Commands, USARSTRIKE and USAFSTRIKE. They list the outputs that can be expected for the units and in some cases define them quantitatively. These lists are designed to assist unified and specified staffs in determining exactly what force mix a situation requires. The Checklists represent substantial progress toward the task of defining outputs for all DoD organizations, a major task of the program under discussion.

A shortrun effort has recently been initiated, to develop output measures for selected program elements of the Five-Year Defense Program (FYDP). The program elements selected are those which promise rapid development of the output measures so that the first phase could be implemented for fiscal year 1970. Specifically, the project includes all except industrial fund program elements in FYDP programs 7, 8, and 9. These programs are the dependent or support-related programs whose composition is dependent upon the size and character of the force-related programs. The program elements for base operations, command, training, and military family housing for programs 1 through 5 were also included because of their supportive nature.

The objective of the shortrun project is to establish data, available to OSD, which relate output to expenses in terms of the FYDP. It now appears that the target date of July 1, 1969, will probably be met for only a few of the program elements included in the shortrun project. Additional elements will be added at 6-month intervals as new measures are developed. As the reports become available and are subjected to analysis, improvement of the measures selected will be possible.



"For what?"

However, it should be emphasized that the measures developed by the shortrun project will not be immediately usable as inputs into the decisionmaking process. First they must be validated and stabilized. Even after a valid and stable measure is established, historical data will be required before trends and other relationships can be determined. These operations will probably consume 3 or 4 years. Output information or productivity measurement has a significant role to play in the efficient utilization of resources by the Government. No other area of Federal management offers as much opportunity for improvement. This was recognized by both the late President Kennedy and former President Johnson who stressed the need for productivity improvements and the need for proper output measurement in Federal activities. Since our Defense budget for fiscal year 1970 is a record \$83 billion, the U.S. Congress could justifiably assume the role of a corporate father and demand "For What?" That question deserves a clear, valid, and unequivocal answer. □

#### DCA PRESENTS AWARDS

"For convenience of the Government" is a phrase widely known throughout the Federal Government.

But at Headquarters Defense Communications Agency (DCA), Sp. 7c, Jack B. Doyle, USA, of Alexandria, discovered that as a "matter of convenience" green-striped computer tabulating paper was being used on any printed output requiring more than one copy. The continued use of this paper would represent a substantial expense to the Government, Doyle decided.

He suggested that the DCA Operations Center, where he works as a computer production controller, change all existing paper stock (once current stock was de-

pleted) to the General Services Administration plain white-lined tab paper and delete the more expensive screenline paper from its inventory.

Lt. Gen. Richard P. Klocko, USAF, Director, DCA, presented Doyle a check for his suggestion, which was adopted. Estimated quarterly savings are \$5,290.

Another DCA man, M. Sgt. Louie R. Hanson, USAF, of Fairfax, was presented a cash award by General Klocko for his suggestion for key card drawers to provide better security for classified materials at DCA Automatic Digital Network (AUTODIN) sites.

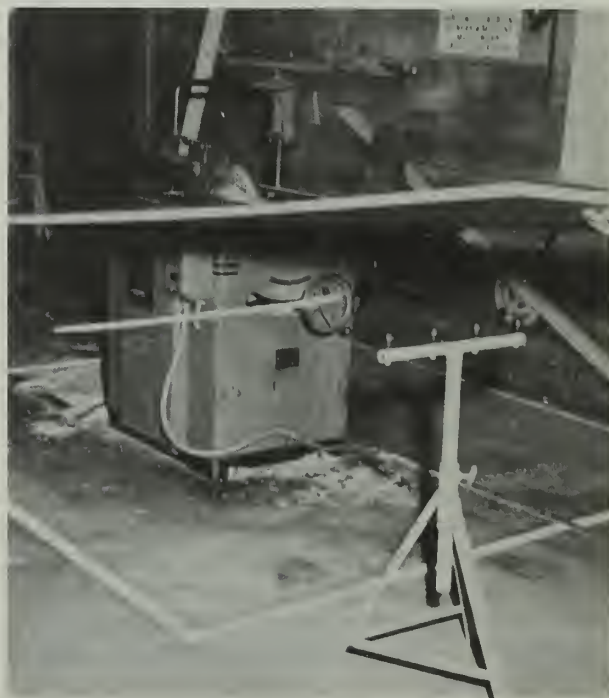
Sergeant Hanson's suggestion was coordinated with the U.S. Army Communications Systems Agency, and the Lexington Signal Depot is manufacturing the initial production models of the key card drawers.

Sergeant Hanson's suggestion is considered to be "of major significance" in aiding the operation and administration of AUTODIN Automatic Switching Centers, according to the DCA AUTODIN Project Management Office.

The awards to Doyle and Hanson are the first major ones to DCA employees under new criteria that include military personnel, as well as civilian in the Suggestion Program. Doyle received \$760 and Hanson \$300.

#### FOR DO-IT-YOURSELF FANS

Rudolph C. Menini, Fort Wingate Army Depot, developed the support brace (in foreground) to eliminate the need for an extra man to keep the plywood properly positioned during the sawing process. Labor savings are estimated at \$1,500 annually.







- Donovan, Frank, *BRIDGE IN THE SKY*, New York: David McKay Co., 1968, \$5.95, 209 pp., reviewed by Joseph Annuziata, SAFAAR.

The success of the European Recovery Program and the planned formation of a West German government led the Russians to attempt to force the United States, Britain, and France out of the Western sector of Berlin by closing off all road, rail, and water access to it on June 24, 1948. The author maintains that the Allies' decision to supply their sector uniquely by airlift was critical in preventing further Russian Communist expansion in Europe. While evoking some of the romantic and humorous aspects of the operation, he gives a detailed presentation of its political, strategic, and logistic background.

Initially, it was not thought feasible to supply the entire 2 million population for more than 6 weeks, by which time it was presumed negotiations would have settled the problem. The only transports immediately available to USAFE at Rein-Main and Wiesbaden were some 110 twin-engine C-47's, or Gooney Birds. Most of these had been used in the Normandy invasion 6 years before; a few had flown the Hump the China-Burma-India theater. The British had a few twin-engine Dakotas at Celle and Fassberg. The airlift would have to operate 24 hours a day, in all weather, and would be limited to three 20-mile corridors and two (later three) landing fields in Berlin. The British would use the northern corridor to Gatow Field in Berlin, while the Americans would use the southern corridor to Templehoff Field; both would return by the central corridor.

On the first day, June 25, 32 flights landed 80 tons of milk, flour, and medicine in Berlin. But this was not enough to supply the city's minimum needs. The Americans gradually replaced the Gooney Birds with 225 four-engine C-54's, which enabled them to triple the tonnage per flight. Also, since the round-trip distance from the British zone was about half that from the American zone, the Americans replaced many of the British Dakotas with C-54's and began flying some of their cargo from Celle and Fassberg. Ultimately, the American and British operations were combined into a single airlift under unified command.

As fall approached, the "cowboy" aspect of the early weeks of the airlift changed to a smooth, assembly-line pattern. A system was developed so that 10 tons of cargo could be moved from a truck trailer to a C-54 in 20 minutes, and removed in 13. The planes made two round trips a day, taking off every 3 minutes with staggered elevations at 500-foot intervals between 5,000 and 6,500 feet. Squadrons competed with one another for tonnage delivered. By the end of August, the combined Anglo-American daily tonnage was about 5,000—well over the minimum requirement of 4,500 that was estimated as a survival level. The airlift was now drawing supplies from all corners of the globe: Butter from Denmark, coffee from Brazil, sugar from Cuba, wheat from Minnesota, coal from the Ruhr.

In January, there were indications that the Russians were beginning to weaken. The airlift had been able to function through the 2 worst months of winter and was now rapidly increasing its delivery to nearly 10,000 tons daily; during the December elections, angry West Berliners had decisively repudiated communism; and an Allied counterblockade was seriously affecting the East German economy. On May 12, the Russians called an end to their blockade of West Berlin.

Throughout the 11-month airlift, there were only 31 American, 39 British, and nine German fatalities, most of which were on the ground. The airlift was the safest air operation in history, considering that there was a total of 276,926 flights to and from Berlin.

Shortly after the airlift started, the Russians began a scare campaign to intimidate the Western fliers. They formally announced that on certain days there would be antiaircraft practice in the vicinity of the corridors. But at no time during the lift did the Russians attempt to interfere with its operation. The air corridors were the one form of access to Berlin which had been guaranteed in a formal written agreement. As in other cases, when the Allies showed determination to resist Russian expansion, the Russians backed down.

- "Military Sales Bolster Free World Defenses," *Armed Forces Management*, January 1969, pp. 55-7.

(Note: This article is based on an interview with Henry J. Kuss, Deputy Assistant Secretary of Defense—

International Logistics Negotiations, and his principal deputy, Leonard A. Alne.)

The Foreign Military Sales Act of 1968 fulfills the goals of the military aid program by encouraging developed nations to share the burden of free world defense and by helping underdeveloped nations achieve the security necessary for internal development. At the same time, the act eliminates many of the defects of past arms sales programs. It provides authority to make cash and credit sales, responsibility to control these sales, and responsibility to keep Congress informed about them. All funds for future Government credit sales will come from a new annual credit authorization. The Export-Import Bank will finance credit sales only to developed nations, and the DoD "revolving fund," from which repayments could be withdrawn to finance new credit sales, has been abandoned. New requirements for semiannual and annual reports to Congress on the entire status of foreign arms sales have been imposed.

Defense planners hope to foster more funding of arms sales by private sources. This will reduce Government appropriations, but will not lessen congressional control over the program. The full amount of any private loans guaranteed by DoD will be charged against the total sales authorized by Congress. DoD officials also want to encourage U.S. industry to remain competitive in international markets.

As other nations advance technologically, they are becoming less satisfied with finished-product sales from the United States. Coproduction and licensed production are becoming more important. If U.S. communications and electronics manufacturers are to survive in foreign markets, they must concentrate directly on foreign needs rather than "riding piggyback" on prime contractors' products. For example, in aircraft procurement, only about 25 percent of the total cost is attributed to the airframe; the remaining 75 percent of the total cost is for communications and electronics equipment which comes from dozens of subcontractors who "ride" their products in on the airframe. However, in the future, only about 50 percent of all sales will be for completely equipped aircraft. Sales of component parts will depend on whether U.S. manufacturers can compete with the importing nation's domestic producers and other foreign sources.

- Danhof, Clarence H., **GOVERNMENT CONTRACTING AND TECHNOLOGICAL CHANGE**, Washington: The Brookings Institution, 1968, \$8.75, 472 pp., summarized by The Brookings Institution, Brookings Research Report 89.

(Note: Mr. Danhof, formerly a member of the Brookings Staff, is professor of economics at the George Washington University, Washington, D.C.)

Government contracting for research and development has been described as a "new federalism" of

science and technology. As the Federal contract system grew, the Government assumed responsibility for acting whenever it believed it in the public interest to solve a problem and was persuaded of the merits of the proposed solutions.

Before World War II, Government procurement generally followed the competitive bidding process set forth by law, except when the armed services used their own production facilities. However, as early as the 1920's the Government began to underwrite the development of experimental planes under arrangements outside the traditional pattern of competitive bidding. During World War II, Government agencies were permitted to negotiate for the production of war items. The Office of Scientific Research and Development, established in the Office of Emergency Management in 1941, was the central clearinghouse for R. & D. projects. OSRD assessed the feasibility of a project and identified the private facility or individual scientist best able to handle it.

After the war, it was generally agreed that the wartime procedure of involving private institutions and individuals had been very effective and should be continued. Congress has tended to favor the contract method as a stimulus to private enterprise, and maintains standing committees to handle R. & D. affairs. While the interests of constituents play some part in determining a given legislator's attitude toward the awarding of contracts, there is no proof that political pressure has hurt the integrity of the system.

As the United States increased its science efforts after the Soviet Sputnik in 1957, the Government increasingly turned to private institutions. Federal support was given to education and manpower utilization, some of it carried on by consortia of colleges, nonprofit organizations, businesses, trade associations, and labor unions. Private institutions under contract have been widely used in the poverty program and in technical assistance to less developed countries.

There is no doubt about the benefits of the system but there are some questions about it. In the universities, there is criticism of the commitments of faculty members to activities other than teaching as well as concern about the divided loyalties of those who get research funds from Government agencies. There is some question as to the effect on R. & D. of the emphasis on Government objectives as opposed to the development of civilian-oriented technology. And there is concern about the traditional lines of separation between local and national authority, and between public and private interests. The fear that the system has achieved an uncontrollable internal momentum and questions about the hidden costs of the system must be answered by a nation committed to the support of science and technology but uncertain of the ultimate value of the method chosen to provide this support.



- Orlans, Harold, ed., *SCIENCE POLICY AND THE UNIVERSITY*, Washington: Brookings Institution, 1968, \$7.50, 352 pp., summarized by Tacy Cook, SAFAAR.

As Government grants to American universities for scientific research and education have increased, their purpose and effectiveness have been questioned. Among the issues involved are the criteria for awarding grants, the amount to be awarded, the role of Congress, and the relationship between Government and universities. These issues were examined in a series of seminars at the Brookings Institution.

Grants are currently awarded either to individual investigators for specific projects or to academic institutions for local allocation. However, the self-generated goals of individual scientists often compete with the administrative goals of the university; the allocation of Federal grants through one form or the other depends on the goals of the university in scientific research and education. It would be desirable to reduce the number of individual grants and increase those to universities: this would simplify the task of obtaining, awarding, and accounting for Federal funds, permit the money to be used more flexibly to meet special local requirements, and allocate to universities some of the power and creativity now wielded by distant forces which control the purse strings. The present lack of original goals and original educational forms in many universities is due in large part to the fact that the Government puts a premium on the big university and on huge, expensive research.

One method of solving the conflict between project funding and institutional grants is the approach of the National Science Foundation and the National Institutes of Health. This system awards selective institutional grants based on a percentage of project grants going to the particular university. But this does not satisfy institutions which confer a great number of science degrees in comparison with the Federal research funds they receive. The various Government agencies are apparently unable to coordinate their programs, resources are inadequate, and the areas of this country most in need of a distinguished university are often those where money will not suffice to create one because other facilities are lacking. In trying to coordinate some of these programs, it has been proposed that a yearly report on Federal programs for scientific research and development be submitted by the executive to the Congress.

On the basis that science differs inherently from technology and therefore the two should not be lumped together for budgetary purposes, a separate Federal budget was established for university science in 1966. This showed the need for a 15-percent increase in expenditures for 1966 and 1967, but the program was abandoned in 1968 because of the Vietnam war. However, since the university's interests in scientific re-

search and education are not identical with those of the Nation, the Vietnam war was not a sufficient reason to discontinue expansion of the grant program. The result has been tension between the university's service to the Nation and to itself, between science's homage to government and to nature.

- Drucker, Peter, *THE AGE OF DISCONTINUITY*, New York: Harper and Row, 1969, *Washington Post*, February 2, 1969.

People today are disenchanted with their inefficient governments. In both domestic and foreign affairs, governments have grown too unwieldy to be effective. Agencies have become autonomous and follow their own policies rather than those of the government. Bureaucrats, identifying with their agencies, have emerged as the real powers. Even the President cannot impose his will on them. This disparity between nominal and real power, which threatens the government's ability to provide leadership, is perhaps the most serious problem of government.

Certain aspects of modern government are inevitable. As a protective, conserving organ, it is naturally concerned with procedures. As a result, it cannot easily make innovations or abandon projects. Government requires a bureaucracy because it must be held to account for everything, lest dishonesty spread throughout the institution. The bureaucracy must be protected from political pressures; unfortunately, this protection has also protected it from public demands that it perform effectively.

These problems can to a large extent be corrected. To enable the government to abandon projects more easily, agencies can be established on the understanding that they are provisional and will have their appropriations renewed after 5 or 10 years if they provide satisfactory results. This will require that policy goals be carefully defined and that the results be compared with the expectations, possibly by an independent agency resembling GAO. The total audit could be accomplished through sampling methods using modern probability mathematics. Also, the bureaucracy can be made more responsible if bureaucrats are rewarded for efficient performance and penalized for inefficiency.

These improvements would make government more efficient without making it a "doer." Government's function is not acting but making decisions: The two are not compatible and trying to combine the two functions paralyzes the ability to do either effectively. Government should follow the policy of "decentralization" used in business, where the top management is strengthened so that it can make decisions and the actual doing is left to other groups, each one being fully competent in its own field. This policy could be called "reprivatization." Instead of trying to perform all tasks itself, the government would turn these tasks over to autonomous agencies. Private institutions could accomplish government goals with government coordinating their

work. The crucial factor is not the ownership of the institutions, which may be public or private, but the fact that they are autonomous. Provided that each institution concentrates on its own sphere and respects the integrity of other institutions, they can work effectively together.

There is no question of permitting the state to wither away. On the contrary, a strong, vigorous, and active government is needed. Although people have tended to believe that there is a choice between a government that does everything and one that does nothing, reprivatization is a valid alternative. It would strengthen government by enabling it to fulfill its managerial functions.

- Wolk, Herman S., "The Military-Civilian Defense Team—Time for Constructive Self-Analysis," *Air Force Magazine*, February 1969, pp. 52–5.

Mr. Wolk believes that effective policymaking requires clear communications by and among Government agencies. The Secretary of Defense and his civilian aides can set an example of clear communications for the military by reducing jargon, obfuscation, and narrowness of outlook in the DoD. Military staff work is often a stereotyped reworking of older papers, in which subject and date are changed, rather than an in-depth analysis or a clear expression of new ideas. But civilians interposed between the Services and the Secretary of Defense also have their peculiar methodologies which hinder effective communications. Contract work accepted from "nonprofit" institutes is often of little practicality in formulating effective policies, and the Department's infatuation with quantification has reduced creative thinking. This is particularly evident in the attempt to "measure" the "progress" of what was primarily a political and psychological war in Vietnam. The graphs failed to "measure" the force of personality, the effectiveness of leadership, the character of nationalism, and the extent to which a country and a people had been sapped by 20 years of war. Now is the time for the DoD to downgrade computers and to strengthen human relationships and rational communications.

- Niskanen, William A., "Defense Management After McNamara," *Armed Forces Journal*, February 8, 1969, pp. 17–21.

Mr. Niskanen maintains that the Defense Department, under the centralized control of OSD since 1961, needs some management reform. A small group of OSD civilians has assumed the role of planning defense pro-

grams, without explicit political requests for defense outputs and experienced Service statements on the most effective way to provide those outputs. Their zealous concern about redundancy sometimes reduces capabilities as well as costs. Primary responsibility for force planning and R. & D. programs should be transferred from OSD to the Services. OSD should only review programs proposed by the Services and bear the burden of proof that better programs could be achieved. Redundant research and development programs should be encouraged, since it is increasingly apparent that this is requisite to sustained technological progress. Small, even conspicuous, examples of inefficiency must be tolerated as the price of providing Service managers with the incentive and latitude to undertake actions to improve the general efficiency of their organizations. As war is too important to be left to generals, defense planning is too important to be left to civilians.

- "The Technological Gap—in Russia," *The Economist*, February 8, 1969, pp. 64–5.

The Russians have discovered that their Marxist economy is not conducive to innovation. For example, factory managers are reluctant to try new ideas, fearing they will be penalized for failure; and scientists prefer pure research to development, produce only half as much as Americans, and take twice as long to put innovations into effect. The lag in Soviet scientific achievement is also due to a lack of intellectual curiosity on the part of scientists and to the fact that their industrial research is often divorced from industry's real interests.

Efforts are being made to devise formulas for measuring the possible cost-effectiveness of innovation; for giving factory managers a choice of innovations to adopt in their plants; and for creating incentives to adopt innovations, together with a price system that will not penalize the manager who does so. The Russians are finding however, that incentive in a Marxist economy is difficult to encourage. The first attempt at offering factory managers "innovation bonuses" ended with most of the money set aside for bonuses unspent.

The Russians' failure to solve their research problems presents a lesson for Western science. For the more Western governments finance "big science," the more they will run into Soviet-type problems. In the West innovation comes not from large but from small companies that have overheads low enough to allow them to experiment. However, tax, financial, and institutional factors are making it increasingly difficult for the small companies to exist in Britain and Western Europe—but not yet in the U.S. □



# About People Here and There—

## "SERGEANT SUGGESTION"



SGM James E. Rowlett, of Fort Knox, Ky., is one of the biggest men in the Army—in several ways. He's 36 years old, stands 6'6", weighs in at 270 pounds. In addition, he has made over 250 suggestions within an 18 year period. He has received 55 suggestion awards (excluding cash awards), another 18 suggestions have been approved but have not been released by the Incentive Awards Committee, and 40 more are still pending.

In 1968 alone, he was awarded \$2,175 for 18 suggestions. "I supplement my income that way," he says. "Most of them are just commonsense ideas." The largest award, for \$900, was made on November 20, 1968, for first-year savings of \$49,030 in utilization of storage space.

He suggested that existing metal storage bins used to store loose items of various sizes be modified to include additional shelving. This was done by use of dividers, special drawer-type boxes, etc. It allows additional segregation of the stored items, easier storage, and fuller use of existing storage space. This suggestion is now being considered for qualification under the Army Cost Reduction Program.

A Certificate of Achievement for Outstanding Service recognized the 101 suggestions Sergeant Rowlett made from November 1966 to April 1968. Tangible monetary savings during that period were estimated at \$250,000, with intangible benefits in several categories.

How does he do it? He says he submits his ideas for an initial screening by a tough committee consisting of his daughter and two sons.

Sergeant Rowlett originally hails from Georgia.

## CERTIFIED BRAINPOWER



Morris Wenick is sort of a human think tank at Defense Contract Administration Services Region Philadelphia, a field activity of the Defense Supply Agency. Here he is shown surrounded by a snowfall of certificates signifying Suggestion Awards which he has won. His grand total of such awards at this writing is 38. His recent awards dealt with such subjects as reducing the number of copies of certain correspondence and placing of telephone extension numbers on published lists, thereby saving time in transferring calls. He has been a Government employee for 29 years.

## A TISKET, A TASKET . . .

A homemade rubber gasket for pipeline overcouplings at the U.S. Army Inchon Petroleum Depot, Korea, saved \$13,119 in fiscal year 1968.

Overcouplings reinforce pipe couplings at points where leaks occur. Gaskets couple the overcoupling to the coupling. Weather, the piped petroleum, and pipeline pressure cause these gaskets to deteriorate. The repair practice was to throw away overcouplings with worn gaskets since new gaskets were not available in the supply system.

Specialist 4 Robert T. Cutler thought the overcouplings could be restored with locally fabricated gaskets. He was right—and now old overcouplings with homemade gaskets are proving just as good as new overcouplings with factory-made gaskets.

## NAVY EMPLOYEE RECEIVES \$1,300 AWARD



**Robert L. Sheetz of the Ships Parts Control Center accepts a Superior Accomplishment Award for \$1,300 from Rear Admiral Frederic W. Corle, Commanding Officer.**

Robert L. Sheetz, 118 Victoria Dr., Mechanicsburg, an employee of the Navy Ships Parts Control Center at Mechanicsburg, has received a \$1,300 award for adapting fuze casings to meet an urgent need for shells in Southeast Asia.

Sheetz is an industrial specialist in the Center's Ammunition Division.

Because of his initiative, Sheetz was able to arrange delivery of the shells in 7 months, instead of the 15 months that would have been required to manufacture new fuzes.

At the same time the adaptation resulted in reducing fuze costs to about one-fifth—or an actual cost of \$51,560 against the \$298,378 of new fuzes.

The fuzes are an auxiliary detonating type used in a variety of shells, but in their original form are not compatible with the 3-inch .50-caliber shell that was needed. The two types of fuzes had different metals, weight, and length.

Sheetz obtained a go-ahead from Navy ordnance engineers to use the fuzes on hand, and to have them lengthened to fit with greater precision inside the cores of the projectiles.

No fuze for that size projectile had been made for many years.

The fuze casings which were adapted came from stock subject to disposal, and which in 1963 had been transferred to the McAlester Naval Ammunition Depot, Okla., from the disestablished Macon, Ga., Naval Ordnance Plant. Sheetz, incidentally, recommended the transfer.

Sheetz is a native of the State of Indiana.

He and his wife have a son, James, a sophomore at Cedar Cliff High School.

Sheetz has set aside his award winning to apply toward his son's college expenses.

## WHEEL SPINNING MARKS EFFICIENCY

Charleston Army Depot says that a wheel journal is *not* a magazine on stock car racing. The Depot says that wheel journal is that part of a rail boxcar's rotary shaft which revolves within a bearing so as to reduce wear and tear from friction.

The more polished the journal, the less the friction. And therein lay the rub when 160 knocked-down surplus rail boxcars stored at the Depot had to be assembled against a tight schedule for moving ammunition interplant at various Army and Navy installations. Two Depot employees (Joseph D. Pendarvis, Chief, Maintenance Division, and D. K. Walters, Chief, Metal, Rigging, and Carpenter Branch) rigged a jig that holds the journals on center and rotates them (by air motor) to permit jiffy conditioning with abrasives and polishing cloths.

Machine polishing beats hand polishing by 2 hours and 15 minutes per journal. That adds up—in round figures—to \$33,000 in fiscal year 1969 and \$34,000 in fiscal year 1970 on a total of 1,300 journals.

## PLAQUES AT RED RIVER

Col. Lawrence E. Van Buskirk, Depot Commander (extreme left in photo), presents awards during Cost Reduction Week at Red River Army Depot, Texarkana, Tex. From left to right: Lt. Col. Richard H. Bergstrom, Director for Aircraft Maintenance, was recognized for his Directorate's outstanding contributions to the Program; Mrs. Flora G. Nettles was honored as the Outstanding Area Coordinator; and A. E. Kackley, Jr., was named the Outstanding Cost Reduction Officer. Six achievement awards for cost-saving ideas, nine letters of appreciation for outstanding accomplishments in program administration, and a special letter of appreciation to Mr. Tom Knott (Chief of General Supply Division, which accomplished 317 percent of the depot's Preservation, Packaging, and Packing goal) were also presented. Red River achieved fiscal year 1968 savings of \$2.2 million, which represented 252 percent of its assigned goal.





## **WOMAN'S WASHER WORK SHRINKS PRICE**

Never underestimate the power of a woman.

In particular, don't underestimate the power of a woman stunned by the high price of an item as simple as a flat washer.

Recently, the Defense Industrial Supply Center (DISC), Philadelphia, Pa., a field activity of the Defense Supply Agency, was asked to procure 800 flat washers used in the sophisticated F-100 aircraft.

Mrs. Helen Bachin, a buyer in the DISC Directorate of Procurement and Production, felt that a price of \$7.15 per washer, quoted by the sole-source supplier, was much too high. She sought value engineering assistance from Joseph V. Adams of the DISC Directorate of Technical Operations.

Value engineering investigation revealed that existing Government specifications covering the material, protective finishes, and manufacturing processes could be utilized to pave the way for competitive procurement.

On the basis of this revised purchase description, the buyer was able to advertise the item competitively. The ultimate manufacturer offered to procure the washer at a price of 89 cents each, a savings of \$6.26 per washer.

Purchase of a competitive washer resulted in a total cost savings of \$6,260 to the Government.

## **WORN VALVE LIFTERS RESURFACED**

Edgar N. Kyle, a 26-year employee of the Directorate of Maintenance at Atlanta Army Depot, found a quick regrounding process for resurfacing grooves worn in the bottom of valve lifters on 10 HP and 20 HP Military Standard Engines.

Approximately 30 percent of the valve lifters were being replaced during the rebuild of these automotive engines because of that kind of wear. New lifters cost \$1.60 each. Kyle's idea (which cost only \$85 to put into practice) was to fabricate a special holding jig to use with the standard grinder.

Savings amounted to \$3,189 in fiscal year 1968 and will run an estimated \$6,357 annually thereafter.

## **NYLON COVERS REPLACE DUCK**

By changing the design of a machinegun cover unchanged since 1952, Rock Island Arsenal reduced its price 30 percent.

Covers to protect M2 and M63 machineguns were made from waterproofed cotton duck until a VE study showed that a water repellant, nylon coated material gave equal protection. The lightweight nylon also proved easier to assemble into a cover than did the heavier duck. In addition, standard hardware replaced the special hardware required in the original design.

These changes reduced cost per cover from \$41.52 to \$29.01. Savings of \$11,359 were reported for the initial order of 940 covers.

## **AWARDED \$5,465**



Captain Chesley S. Pieroway's idea substantially boosted the emergency power supply of MINUTEMAN missiles for one-tenth the cost of the extensive redesign of Launch Control Center equipment contemplated in approved Air Force requirements. Captain Pieroway received \$5,465 for saving the Air Force \$4,413,130.

## **GEARED FOR CHANGE**

A Japanese employee of the U.S. Army Depot Command, Japan, suggested that typewriters with 60-cycle motors purchased for use in the Kansai area could be modified to meet the 10-cycle difference in the Kanto area by reducing the number of gear teeth in the motor pulley from 11 to 10. The former method of modifying these typewriters had cost \$66.32 per unit. The new method costs only \$3.96 per unit, including parts and labor.

## **BARBERED GROUND SPARES POWER OUTLET**

An inch of prevention is worth the price of a power outlet at Fort Carson.

The 108 lights and 33 power outlets mark the hover lanes and aprons at Butts Army Air Field. These 8-inch to 12-inch high fixtures are located in grassy areas where tractor-drawn mowers frequently bowled them over and broke them.

Not any more though. The ground around each fixture is now shot with pentaprim to prevent grass and weed growth. Tractor operators can now easily spot each fixture in the clear area. One treatment lasts 4 years. The cost of the chemical and labor was \$389, with savings of \$1,411 in fiscal year 1968 and an estimated \$1,800 annually thereafter.

## ANIMALS NEED SAWDUST

The 406th Medical Laboratory at the U.S. Army Hospital, Camp Zama, Japan, keeps animals. Animals need sawdust. A local firm was supplying the sawdust for \$1.10 per kg. bag.

Camp Zama's woodworking shop was throwing its sawdust away. Someone substituted the throw-away sawdust for the purchased sawdust. The substitution saves \$600 a year. The animals do not know the difference.

## NCO HAS \$12 MILLION IDEA

Savings of more than \$12 million in 3 years and more efficient use of manpower and equipment resulted from a cost reduction management action submitted by M. Sgt. Kenneth R. Clipp, Jr., Office of the Deputy Chief of Staff for Materiel in the Military Airlift Command.

Sergeant Clipp felt that unrealistic maintenance criteria prevented MAC C-141 Starlifters from being used at their fullest and caused much unneeded and costly maintenance work.

These criteria called for complete overhaul of every C-141 engine after 3,200 hours of use.

Sergeant Clipp suggested a program for systematically inspecting selected engines in order to more accurately determine engine capability and uncover deficient areas.

The selective approach disclosed that blanket overhaul at 3,200 hours of engine use was unnecessary. As a result, engine overhaul time was changed to 4,000 hours—and later to 4,800 hours—without degrading safety and reliability.

The Air Force saved \$7,386,146 during fiscal year 1968 and another \$5,612,805 is expected to be saved by July 1970.

## CANS, DRUMS AND KAISERLAUTERN

The Kaiserlautern (Germany) Can & Drum Renovation Plant renovates (guess what) gasoline cans and drums. Sporadic, random receipts of empties caused frequent changeovers in equipment to meet differing renovation requirements. Changeover time took away from inplant operation time and resulted in a high unit cost of renovation.

An industrial engineering study led to adoption of a fixed schedule for receiving cans and drums. Orderly receipt now enables the renovation plant to spend alternating 6-month periods repairing only one item. The resulting increase in productivity is saving the Army \$25,800 annually.

## MR. FIXIT

The self-help program isn't particularly new, nor is it a particularly radical concept. Everyone ought to keep his home in a state of decent repair. The Army provides tools, equipment, and materials to individuals who want to do small projects and, like any good landlord, provides skilled workmen to do the bigger jobs.

Sometimes a self-help program runs into trouble when the occupants do not know what tools or supplies are available to them nor just what they are (and are not) permitted to do. When Fort Monmouth found this situation existed, it decided on its own self-help fixit project.

It published and distributed to all quarters occupants a *Quarters Self Help Manual*. All available materials and tools are mentioned, and explicit "how to do it" instructions are given. Not-to-do jobs (i.e., those requiring skilled workmen) are also listed. The manuals, which cost \$770 to publish, stimulated 372 known self-help jobs during fiscal year 1968, saving the \$7,813 that would have been spent had the post shops been required to do these jobs.

## SIERRA'S 11-FOOT FROGS

Sierra Army Depot frogs, which vary in size from 7 to 11 feet, cost \$5,500 less in fiscal year 1968 than in fiscal year 1967. It should be explained that Sierra is not Fort Frankenstein, and that a "frog" is a railroad device that enables trains to cross an intersecting track safely.

Tired frogs—frogs with worn edges—were being replaced by frogs rebuilt commercially. John Wilson, railroad maintenance foreman, thought that the \$225 this unit cost to rebuild was excessive. He took his problem to Mr. Earl McCullough, foreman of the machine shop. The two men decided that the frogs could be rebuilt inhouse. Inhouse repair costs only \$64 each—a savings of \$161 per frog.



## SUBCONTRACTORS HAVE VE INCENTIVES



ITEM	IMPLEMENT COST	GOVERNMENT SAVINGS	BURROUGHS SHARE
RETAINING RING	1,725	126,500	42,170
BOX MATERIAL	750	25,170	8,390
SPOR PROOF BAG	250	114,200	57,100
ESSICANT	0	18,400	(PENDING)
BATTERY BAG	0	8,000	(PENDING)
TOTAL	2,725	292,270	107,660

The Burrough's record of Value Engineering Change Proposals is depicted in this poster displayed during the Value Engineering-Supplier Meeting sponsored by Burroughs. Examining the record are (left to right): Leonard Sundquist, Cost Reduction Office, Defense Supply Agency Headquarters; George Bennett, Value Engineering Office, Defense Contract Administration Service Region (DCASR), Philadelphia; and Philip Halperin, Cost Reduction Program Coordinator, DCASR Philadelphia.

Value engineering, one approach to getting maximum value for each defense dollar, recently received a strong boost when a major Government contractor provided its suppliers with value engineering incentives similar to those available to Government prime contractors.

Burroughs Defense, Space and Special Systems Group, prime contractor for various Government programs, is placing a new value-engineering provision in its subcontracts relating to purchases under those programs. The clause provides that subcontractors may submit Value Engineering Change Proposals and receive a percentage of the savings effected by the proposals.

Value Engineering is a Defense Department program which seeks to simplify the design and manufacture of products and provides for contributing firms to share in any resultant cost savings.

Burroughs' action was taken with the support and encouragement of the Defense Contract Administration Services Region (DCASR) Philadelphia, a field activity of the Defense Supply Agency. The provision, believed the first of its type in the Delaware Valley area, was made public recently at a value engineering-supplier meeting attended by 50 Burroughs suppliers held at Paoli, Pa.

At the meeting, Philip Halperin, Cost Reduction Program Coordinator for DCASR Philadelphia, cited Bur-

roughs' provision as one that may serve as a model for other contractors. Col. Joseph Capuano, USA, head of the DCASR's Production Directorate, affirmed the Government's support of the program. The benefits available to both government and industry through the application of value-engineering principles were emphasized by Leonard Sundquist of the Cost Reduction Office, Defense Supply Agency Headquarters.

Vendors were urged to examine the form, fit, and function of all parts being specified and to submit alternative methods which they feel would be equally effective yet less expensive. Recognizing that more than 50 percent of its 4,000 suppliers are small businesses, Burroughs management offered to work closely with suppliers in preparing and submitting Value Engineering Change Proposals. Subcontractors were urged to submit ideas at the earliest possible time to gain maximum savings.

Several value engineering proposals by Burroughs which had been accepted by the Government were cited by the firm's representatives. Three such proposals saved the Government \$265,870 in 1968.

## VALUE ENGINEERING CONSTRUCTION ADVISORY BOARD

The recently formed Value Engineering (VE) Construction Advisory Board, under the direction of Mr. C. E. Harris, Air Force DoD Value Engineering Council Member, seeks new ways to increase the successful application of the VE methodology to reduce costs in all phases of military construction. Special areas of attention are facilities, utilities, roads and paving, materials, site preparation, procedures and other military civil engineering applications.

The photo below shows the Board. Seated (left to right) are: Messrs. L. Shuman and S. Howell (Navy), W. Alldredge and B. Danford (Army).

Standing (left to right) are: L.T.C. A. Rynties and Messrs. W. Bucholtz and C. Harris, Director (Air Force) and Mr. C. Katreeb, Secretary (DoD VE Services Office).



## TV INFORMS BUYERS

The Defense Electronics Supply Center in Dayton, Ohio, operates a closed-circuit television system designed to further improve efficiency in the Center's multimillion-dollar procurement operation.

The system familiarizes buyers with the items they procure and reduces chances of DESC overpaying for a component. Via closed-circuit television, procurement personnel are able to carefully inspect parts and rationally determine if submitted price quotes are reasonable.

The system was installed by the Dayton Communications Co. and features cameras and monitors in each of DESC's six warehouses plus two monitors in the Directorate of Procurement and Production. Roughly 14,000 feet of coaxial cable and 14,000 feet of audio lines were used during the installation. Officials said that reception over the system is superior to home sets since the closed circuit eliminates outside interference.

DESC warehousemen have been trained to handle the necessary mechanics—staging, camera operations—related to the system. Items which buyers wish to inspect are scheduled at specific times during the day. Tubes, for instance, might appear from 1-1:30 p.m., followed by crystals from 1:30-1:45 p.m. The amount of air time programed for each Federal Supply Class depends on the volume being generated. Officials estimate that roughly 200 items can be inspected each day. Reruns are also programed should the buyer miss the initial telecast.

If an item isn't in stock and the buyer is interested in examining it at a later date, he completes a request form and attaches it to the contract award. The form is processed through the regular cycle and



*DESC officials inspect quality on new closed circuit television system introduced at the Center to assist purchasing personnel. Pictured (l-r) are: Navy Captain Melvin Harris, Director of Procurement and Production; Air Force Brigadier General Glen J. McClernon, DESC Commander; and Vernon Young, Deputy Director of Procurement and Production. Operating the system is Gerald Thomas.*

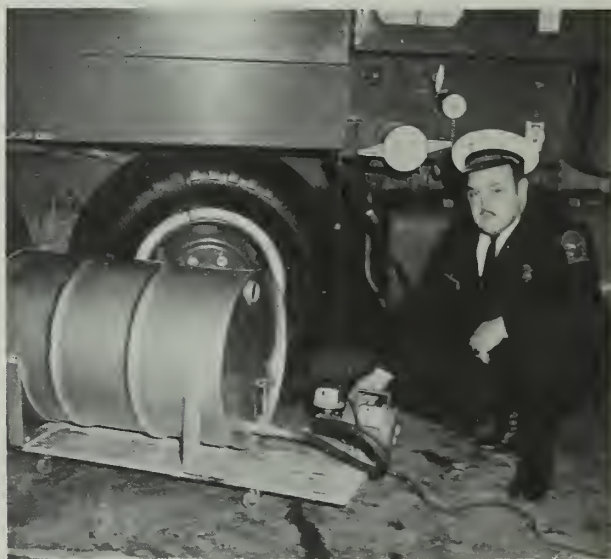
attached to material when it arrives at DESC from the plant. It notifies material handlers at the warehouse receiving station to set the item aside for viewing.

## FLUSHING FAVORS FOAM FLOW FOR FIREFIGHTERS

Herman Schilmoller, Fort Richardson's Assistant Fire Chief, found a cleaner, quicker, and more thorough way to drain and flush foam tanks on the Fort's four 503B fire trucks. The old method did not completely flush the system, and foam not flushed out became aerated and contaminated.

The foam tanks were originally equipped with a single drain valve located high underneath the truck. The single valve did not permit the metering system controlling the flow of foam to be cleaned between monthly flushings of the foam system. This cleaning limitation hampered foam firefighting operations because contaminated foam left in the metering system tended to coagulate and clog the lines.

Schilmoller proposed extending the existing valve to the side of the truck and adding a second valve. The arrangement permits unused foam to be drained into a drum and then pumped back into the tank upon completion of the flushing process without loss of the foam concentrate. Flushing can be accomplished in only half an hour (instead of 4 hours under the old method) by attaching an ordinary garden hose to the extended drain valve, and using domestic water pressure. The second valve makes it possible to clean the metering system independently of the foam tank. Savings will be \$1,200 annually.



*Assistant Fire Chief Herman Schilmoller is shown demonstrating the method he designed to improve the foam flushing operating on fire engines.*



## JIFFY REMOVAL OF FROZEN SCREWS



From the Naval Air Rework Facility, Jacksonville, Fla., came an idea that makes a guy say, "Now, why didn't I think of that?"

Special screws fasten access plates to A7 aircraft pylons. The special screws are "machine fit, high-torque steel" with a variety of recessed heads, such as apex and Phillips. Rust and corrosion frequently "freeze" these screws in place. Conventional removal methods often waste time and damage these screws as well as the surrounding areas.

The facility solved this problem by drilling a hole through the fixed foot of a deep throat "C" clamp, and then affixing to the foot of the clamp a locally designed tool holder having a round stem that protrudes through the drilled hole. This tool holder accommodates various types of standard screwdriver bits and has two flat surfaces on which a common adjustable wrench can be used.

This tool pulls the screwdriver bit into the screw head securely enough to prevent the bit from twisting out of the screw head and damaging the screw beyond further use. Then a wrench is used to apply pressure to the tool holder to loosen the screw. Prior methods employed hand screwdrivers, pneumatic rivet hammers, breaker bars, bit adapters, and wrenches. Frequently the screws were damaged to the point that they had to be drilled out. The hardened screws and the adjacent softer aluminum often resulted in damage to the surrounding areas.

Use of this tool produced a savings of \$7,481 for fiscal year 1969 and a 3-year savings of \$31,000. In addition, the tool's designer, Mr. Harry M. Radvansky of the Metal Division, received \$200 for his suggestion and cost-cutting action. (Photo shows Radvansky removing screw with tool.)

### "CAPS OFF TO NUWS"

Show me a 10-cent plastic cap and I'll show you how to make a savings of \$234,000. That's just what engineer Grenville B. Ellison did at the Naval Underwater Weapons Research and Engineering Station (NUWS), Newport, R.I.

Torpedo batteries utilized a cell cap which failed to vent consistently, thereby plugging up and creating undue pressure and gasses in the battery cells. This, in turn, caused the battery cases to swell and to be deformed, making the cases mechanically unusable and drastically shortening the lifespan of the batteries themselves. If the cases didn't swell, the battery caps and even the covers were blown off by the pressure.

Mr. Ellison recognized this expensive, often dangerous, problem and set about to devise a replacement cap. His idea was a snap-on vent cap made of plastic with a slotted rubber diaphragm. The new battery cap now vents gasses and pressures, and is even easier to use than the one it replaced.

As a result of using the new vent cap, battery life has been extended considerably, battery replacement and inventory have been curtailed and NUWS claims savings of \$234,000 for the Navy from an improved 10-cent item.

### ELBOW OUT OF JOINT?

The Army's 2nd Logistical Command has over 2,000 trailers in Okinawa, Vietnam, and at sea in the "Roll-on, Roll-off" fleet. WO John K. Benson thought that the downtime of these trailers was excessive, so he decided to see what could be done.

Benson found a common cause of repair to be the air couplings, which projected out beyond the trailer hitching mechanism and were constantly being broken during the hitching process. Replacement couplings cost \$1.03 each. A trip to the supply room turned up an elbow joint costing only 11¢—which would place the air coupling in an upright position behind the massive trailer hooks.

In addition to saving \$156 in fiscal year 1968 and \$743 in fiscal year 1969 in parts and labor (no more broken air couplings to be replaced), Warrant Officer Benson elbowed the Army into another benefit: An ever-present safety hazard was eliminated.

### STRATEGIC REPLACEMENT

Office of Civil Defense facilities have been using test set teletypewriters which cost \$2,640 each. A recent re-evaluation made by the U.S. Army Strategic Communications Command permitted the replacement of these rather expensive teletypewriters with a commercial-type portable test message generator. Costing only \$390 each, the test message generators more than fill the requirements of the OCD facilities. In all, eight teletypewriters were replaced, with savings of \$18,000 realized for fiscal year 1969.

## ARADMAC OVERHAULS 1,000TH HUEY

Craftsmen at the Army's Aeronautical Depot Maintenance Center (ARADMAC), Corpus Christi, Tex., have completed overhauling the 1,000th Huey helicopter to come into their plant.

Aircraft whose total original cost was \$239 million were restored to a like-new condition for something like \$66 million.

The statistics buffs at the Gulf Coast installation note that the first Huey came into the giant depot hangar complex late in 1961. And it rolled out again—ready to go—in June, 1962.

In fiscal year 1963 the records show that four of the whirlybirds were overhauled. Twenty-one were completed in fiscal year 1964. The figure was 19 in fiscal year 1965. It rose to 59 in fiscal year 1966, 192 in fiscal year 1967 and skyrocketed to 429 in fiscal year 1968. The schedule for fiscal year 1969 is 495.

The Huey overhauls were completed in addition to work on fixed-wing Army aircraft in the earlier years of ARADMAC's existence. Additionally, the depot has been overhauling Chinooks and Huey Cobras as well as an impressive number of aircraft engines.

## SHIPPING PLAN CONSERVES TRANSPORT

One truck now does the job of three in transporting rocket motors between depot and missile sites, thanks to John K. Dykes who developed a Stop-Off Motor Truck Shipment Plan for the CONUS NIKE-HERCULES missile M-30 Rocket Motor Exchange Program. Dykes is an employee of the U.S. Army Missile Command, Redstone Arsenal, Ala.

When a motor is removed for rebuild under the Rocket Motor Exchange Program, a replacement must be available immediately. Dykes learned that in transporting these motors to and from three NIKE-HERCULES missile sites within a 100-mile radius of each other—even when shipments were on the same day—a separate truck went to each site.

Dykes arranged for a single truck to service all three locations on a single run by coordinating shipping instructions among the depot rebuilding the motors, the missile sites, and the trucking outfit. Uncoordinated, the cost would have been \$444,825. Coordinated, the cost was \$199,305—saving \$245,500, with an additional \$260,000 savings estimated for fiscal year 1969.

## PNEUMATIC HAMMERS SAVE MONEY

Pneumatic hammers replaced manual ones at Aniston Army Depot where construction of 16,611 boxes, crates and pallets each year consumes 4,983,300 nails. Labor savings average \$0.51 cents a unit or about \$8,000 annually.

## BAGS VERSUS SPRAYERS

The Environmental Health Division of the Chief Surgeon's Office, USARSO, developed a new method of controlling mosquito larvae in the peripheral areas of the USARSO Army reservations.

Sawdust-filled bags soaked in a concentrate of malathion diluted with diesel and crude oil and placed in mosquito breeding areas provide larvae control for a 3-month period. The bags have eliminated the need for five laborers using hand sprayers, saving over \$4,000 in fiscal year 1968 and \$11,700 each year through FY 1970.



*Sand bags (15 each) are soaked in 45 gallons of Diesel #2 oil, 4 gallons crude oil and 1 gallon 57% Malathion. Each bag contains regular sawdust, and each bag absorbs about 3 gallons of larvicide. The bags are soaked for 6 weeks prior to their use.*

## THE METRIC BLUES

The difference between metric and inch gage systems caused parts shortages in repair of deadlined vehicles at Army's Munich Equipment Maintenance Center in Germany. Frequently, nuts, bolts, screws, and washers had to be fabricated on order. These special orders increased prices and took extended time to complete.

The Center solved its problem by packratting. All small hardware items and minor repair parts generated in the course of vehicle repairs or salvaged in scrap-ping and cannibalization of automotive vehicles are avidly collected. Processing includes degreasing; cleaning of all rust, corrosion, and old paint by sandblasting; and coating with oil to prevent the gathering of rust. Upon completion of this process, the hardware is sorted by category and size.

This packrat expedient has saved not only time but money as well: \$4,600 to date.





By finding a way to stop very small leaks, personnel at the Air Force's Arnold Engineering Development Center also found a way to save \$83,000.

The problem developed in a wind tunnel test to be conducted on a conical flight vehicle model with two aft control fins. Object of the test was to measure the amount of roll small jets would impart to the model. The jets could be mounted in a variety of positions in threaded holes. Those holes not being used were to be closed with threaded plugs.

When the model had been installed in the wind tunnel, it was discovered that gas leaked past all the inserts, making accurate measurements impossible.

At first, it appeared that the model would have to be returned to the manufacturer for new inserts. This would have entailed both a delay in conducting the test and considerable expense in making new inserts.

After considering the problem, engineers and craftsmen for ARO, Inc., contract operator of Arnold Center, decided to try small plastic gaskets under the inserts to see if they would eliminate the leaks. The tiny washers were made over a weekend, bench tests showed they were effective and testing started on schedule.

By making the test possible as scheduled, four shifts of wind tunnel occupancy time were saved at a cost of \$26,000 per hour. The repairs to the model cost \$200, leaving a net saving of \$83,000.

In photo, an engineer holds the threaded plug in his right hand and the plastic gasket in his left hand.

### NAVY SUPPLY CORPS NOW IN 175TH YEAR

Having progressed from supplying cannonballs to guided missiles, from provisioning wooden ships to atomic-powered vessels, the Navy Supply Corps celebrated 174 years of service to the fleet on February 23.

The Navy's business managers trace their history back to 1785, when Congress created the post of Purveyor of Public Supplies, and charged him with providing material support to the six wooden frigates comprising the U.S. Navy.

Today, the 6,100-man Supply Corps support a million Sailors and Marines, almost 950 active fleet ships, and 8,500 aircraft—enabling the Navy to make its presence felt whenever and wherever it is needed.

To meet these responsibilities, Supply Corps officers undergo advanced training in Naval Logistics at the Navy Supply Corps School, Athens, Ga. Additionally, nearly one-quarter of these officers hold graduate degrees in the sciences, mathematics, and business administration.

This extensive training has kept the Navy in the forefront among those applying computers and advanced business management techniques to military support problems. Presently, Navy Supply Centers, Depots, and Inventory Control Points are linked by a computer network that is being extended to ships as well.

The Supply Corps officer's basic responsibility today is to insure the logistic support of the Operating Forces. To that principle—service to the fleet—he is as dedicated as was his prototype, the Purveyor of Public Supplies, when he outfitted six wooden frigates 174 years ago.

### BRAIN TRUST CONTEST ACCENTS QUALITY

The Naval Air Rework Facility (NARF), Naval Air Station, North Island, sponsored a 6-month drive to stimulate submission of high-quality suggestions. Called the "Brain Trust Contest", the drive, during the period from July through December, produced 482 adopted suggestions compared with 320 during the same period of the preceding year.

Adoptions during the contest averaged 6.4 per 100 employees compared to 4.5 per 100 employees for the same period in the previous year. Many were exceptionally high value suggestions, with total savings of \$653,183 realized for the 6-month period.

Top winner for the entire contest was J. R. Aflague, an airframes mechanic, whose suggestion for an improved disassembly procedure for actuating cylinders has a potential 1-year savings of \$76,000. In addition to a cash award, Mr. Aflague received a trophy designating him as "High Individual in the Command."

The high individual in the Services Departments for the final quarter of the contest was an enlisted man, E. J. Vinson. His suggestion for performing preflight built-in tests on the internal hydraulic and electrical power airborne avionics systems of F-4 aircraft has a potential 1-year savings of \$16,000.

Awards were presented to winning individuals and organizations by Capt. William H. Shockey, Commanding Officer of the Facility.

## PERIODICALS STUDIED FOR IDEAS

Industrial engineering, a new service at 2d Logistical Command these days, is putting new vim and vigor into the industrial complexes of Machinato Service Area and Naha Military Port.

The industrial revolution began when the Directorate for Plans and Management sent a team of management analysts to the Sukiran Library near 2d Log to research an index to periodicals and a list of trade magazines which cover the activities, skills, trades, and processes used in the command.

According to Directorate for Plans and Management's Monthly Review and Analysis publication, the magazines turned up by the team publish articles and advertising of new methods and equipment that have been found applicable and economical in U.S. industry and business.

Armed with this array of industrial ammunition, 2d Log Comd was ready to go hunting for items appearing to have promise for possible use in 2d Log activities.

As a result of the institution of advanced industrial engineering methods and products, production has increased, maintenance has been made more effective and dependable, and thousands of man-hours and dollars are being saved. The future promises even more.

The primary object of the industrial engineering service is to gain more production with the same number of people. One way to achieve this result is to bring the right information to the attention of the right people in the workshops of 2d Log.

- One item new to the command is the Needle Scaling Gun. Fifty of these are in use repairing a drydocked tugboat and other marine equipment at Naha Military Port.

"The needle guns have been used in industry for sometime," Mr. Fred Naylor, a section chief, said. "We at the marine repair facility heard reports from ships personnel commenting on the gun's speed and versatility in removing rust, scale, and old paint," he said.

Naylor made it clear that the guns were not available through current supply channels when earlier attempts were made to get them. However, the Directorate for Plans and Management traced the guns to various companies manufacturing them and assisted in ordering them from sources which met government requirements.

The guns have been used on a variety of surfaces such as ship exteriors, heavy metal containers, hand-rails, and metal bars. The time required to perform the same job by conventional, mechanically operated pneumatic tools was cut by one-third with the use of the needle scaling guns.

Naylor said the guns are light, easy to operate, save man-hours and do not harm the metal being cleaned, as do some other chipping and scaling tools.

- Another new item is a nontoxic, nonflammable, non-

irritant detergent which removes grease, oil, and dirt from surfaces. Cleaning solutions previously used had undesirable side effects. The new item does not.

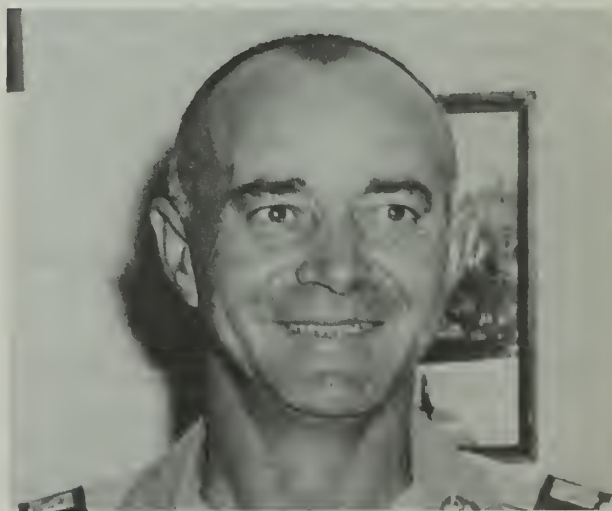
- An improved abrasive used in sandblasting has been ordered. It neither produces dust nor does it absorb moisture. This abrasive promises to reduce cleaning time as it is harder and sharper than sand and it can be reused many times.
- Yet another product being brought to 2d Log is a rust-preventive chlorinated rubber compound with a property called "thixotrophy" which means to "change by touch". This special rubber compound is mixed with a paint to produce a tough protective coating. As an example of its application and use, it can be applied to a surface, and then struck by an object. The result is that the paint seal is not broken, but spreads and flattens, and ultimately resumes its original shape. Normal paints will chip or wear leading to costly rust and corrosion.

"Every piece of equipment that we can get back here and process quickly and either reissue or put into proper storage, properly protected, is going to save taxpayers money," Colonel Steinmetz said.

## "COMBAT-IN-CITIES" TRAINING

Command Sgt. Maj. James E. Henry, Fort Irwin, Calif., suggested that a mock city, for use in a "combat-in-cities" training course, be built from condemned substandard housing. Located in the Post Housing Area, the substandard units were to be torn down to make way for new quarters.

The condemned units were moved, whole and virtually intact, to the training area. The cost of moving the units, including labor, was only \$5,637 as compared to the \$86,850 price tag for building new training units. Total realized savings: \$81,213. Sergeant Henry (photo) received \$1,000 and a commendation for his idea.







Brig. Gen. Ralph H. Spanjer, USMC (left), of Headquarters Defense Supply Agency, presented the first Industrial Zero Defects Achievement Award to Henry W. Gadsden, President, Merck & Co. at the Merck, Sharp & Dohme plant in West Point, Pa. Col. Gerald Johnson, Jr., USA (center), Commander of Defense Contract Administration Services Region, Philadelphia, is head of the organization which administers the firm's prime contracts for pharmaceuticals for the Armed Forces.

For 3 years the company has maintained a "Pride and Quality" program aimed at eliminating sources of errors and at motivating employees to achieve defect-free work.

#### **GWU OFFERS VE. MANAGEMENT COURSES**

The George Washington University, School of Engineering and Applied Science, Washington, D.C., has announced the offering of two short courses in management of value engineering for commercial and defense industry and government agency personnel. The first, a 2-day seminar for key middle managers, is to be held 28-29 May; the second is a 5-day short course for high-level managers from July 14-18. These course offerings are part of the University's Continuing Engineering Education Program designed to give the manager an understanding of what the value engineering discipline is and how it can be successfully applied to enhance income and to improve products or systems. An engineering background is not a prerequisite for enrollment.

Staff instructors for both courses are Mr. Frank H. King, Value Engineering Director, Department of the Air Force, Systems Command, and Mr. Rudy H. Kempter, Office of the Assistant Secretary of Defense (I. & L).—Value Engineering Directorate. Guest industry lecturers include: Mr. Stephen Holland, Eastern Air Lines; Mr. Alphonse Del 'Isola, Louis C. Kingscott & Associates, Engineering Consultants; Mr. Samuel Hale, General Electric Co.; Mr. Carlos Fallon, Radio Corp. of America, and Mr. Kenneth Jackson, Dynelectron Corp. Course information may be obtained from The George Washington University, Continuing Engineering Education Program, 2424 Pennsylvania Avenue NW., Washington, D.C. 20006.

#### **TONGS TURN TUBES**



James C. Bloodworth, of Atlanta Army Depot, removes a push-rod tube from a military standard engine. Bloodworth is using a tool which he fabricated to preclude damaging the thin metal tubing. The tonglike instrument has a smooth, wide head surface which does not dent, nick, or scar the metal tubes being removed. Use of ordinary pliers was causing a 10-percent loss of tubes. The new tool will provide a cost reduction of \$4,800 this year. In addition, it reduces from 4 to 2 minutes the time required to remove the tubes.

# ALL SERVICES PARTICIPATING IN OPERATIONS RESEARCH/SYSTEMS ANALYSIS COURSE

On 31 January 1969, the U.S. Army Management School at Fort Belvoir, Va., graduated 63 military and civilian participants from its 4-week Operations Research/Systems Analysis Executive Course. Of this number, 44 were military and 19 were civilians.

The OR/SA Executive Course was first offered in January 1968. Up through January 1969, over 500 participants have completed the course—460 from the Army, 22 from the Air Force, seven from the Navy, and 15 from the Marine Corps. A new class, programed for 64 participants, is presented every 5 weeks the year round.

Knowledge of Operations Research and Systems Analysis (OR/SA) has become essential at all management levels in the Armed Services. Between the top-level managers and the technical experts who are fully knowledgeable in this field, middle managers—both officers and civilians—must now have practical knowledge.

As is quite apparent, the number of complex military problems is constantly increasing, and analytical techniques can contribute toward solving these problems. Improved OR/SA capability can aid the Armed Services today in the face of their sharply increasing requirements in such applications as the evaluation of alternative force structures, new weapons systems, and proposed military capabilities.

The OR/SA Executive Course was established at the U.S. Army Management School to help meet these increasing requirements. The course is presented to acquaint officers (majors, lieutenant commanders, and above) and civilian employees (GS-13 and above) with OR/SA techniques, their military applications, and also their capabilities and limitations. Upon graduation,

participants are expected to have an understanding of OR/SA techniques such that they can manage OR/SA studies, evaluate them critically, and interpret them to decisionmakers.

At the Army Management School, OR/SA teaching methodology is divided between informal group lectures and instructor-led work group sessions. Subjects are taught through extensive use of military problems and case studies, some of which are presented by the experts who performed them with contractor and highest-level staff organizations. Individuals are required to analyze these studies, discuss them in work group sessions, and present their evaluations to the entire class. Problems and case studies are not oriented solely toward any one service.

Many experts distinguish between Operations Research and Systems Analysis while still others consider them to be overlapping. Operations Research is generally concerned with analyses of the optimum use of resources to accomplish an objective. Scientific techniques are used that determine the optimum tactics, strategy, and allocation of these resources. Typical analyses are directed toward the optimum employment of forces or weapons systems in a given situation.

Systems Analysis is generally concerned with analyses of the utilization of future resources in future situations. A typical analysis may be directed toward determining the ability of alternative systems with various performance characteristics to achieve a specified objective. Systems analysis lays stress on the cost and use of future resources and generally deals with uncertainties. It must analyze trade-offs (weight versus speed, size versus shape, etc.) in determining preferences from among several alternatives.

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## DEFENSE OFFICIALS DISCUSS CRP PROGRESS



At a Cost Reduction Program conference on April 29 attended by 50 Program administrators and auditors, Assistant Secretary of Defense Barry Shillito (extreme right in photo) received progress reports from each military department and DSA. Photo shows Kenneth Kilgore, Deputy OSD Comptroller for Audit, making the point that adequate audit coverage of savings must be continued in order to maintain Program integrity and credibility.



## EFFICIENCY IS A BLANKET PERMIT

Tobyhanna Army Depot no longer obtains a \$7.80 State permit each time it roadtests a repaired or overhauled M-123 truck tractor on Pennsylvania's State highways. Instead, it obtains a single blanket permit to road-test all vehicles in one project. A blanket permit for 650 vehicles in a recent project cost \$27.84—saving the Depot \$5,063. In addition, the suggestion saved considerable administrative time previously expended in processing individual permits.

Tobyhanna's Henry Kwiatkowski sparked the change.

## THE CASE OF THE OBTURATOR SPINDLE

How do you rebuild an M-53 gun when the supply system is temporarily short of an essential part? Ask Joseph E. Hepner, who does his sleuthing in the Mobile Equipment and Weapons Division of Tooele Army Depot.

The short supply item was the M-53 gun's obturator spindle, which goes in the breech of the gun to prevent the force of the powder's detonation from reversing through the breech. Some obscure clues led Hepner to the obturator spindles on M-55 Self-Propelled Howitzers which were being scrapped both at Tooele and by the Marines in Barstow, Calif. Further detective work revealed that this larger spindle could be machined down to size and chromeplated to meet the requirements of a new M-53 spindle.

Not only were Tooele's immediate needs met but 40 additional spindles were reprocessed and returned to the supply system. Net savings: \$15,569.

## FIRM COMPRESSES CONCERTINA SHIPMENTS

A value engineering change proposal by a Miami, Fla., firm has resulted in a government savings of \$545,112 and a reward to the contractor of \$67,173 for his efforts.

It was the largest cost-reduction savings from a value engineering change proposal since the inception of the Defense Supply Agency's Value Engineering Program at the Defense Construction Supply Center (DCSC), Columbus, Ohio, a field activity of the Agency.

Ojus Industries, Inc., manufacturers of concertina tape wire on a contract from DCSC, accomplished the

## VARIATIONS ON A VOLTAGE THEME

Fluctuations in voltage levels caused by a transient voltage surge was losing valuable (\$101 per hour) computer time (258 hours in 1967) at the U.S. Army Tank Automotive Command. In addition, this voltage surge was weakening components in the central processor. Carl F. Cramer, an Electronics Technician, decided something had to be done.

Cramer thought that a line filter would correct the voltage variance. He contacted a manufacturer who could specially build these filters and learned that the price would be \$3,000 per filter. Purchasing the four required would have netted a substantial savings, but Mr. Cramer still wasn't satisfied. So he built an equally satisfactory filter—for \$272.

Cramer's ingenuity reduced lost computer time 75 percent and produced savings on the cost of the filters. It added up to \$24,412 in fiscal year 1968, with estimated annual savings thereafter of \$20,250.

savings on a change proposal in the bundling method for shipment of the wire. The firm effected a reduction in the overall bundle size through a new compression process while increasing the number of coils per bundle. The action resulted in reducing the measurement tons per shipment, thus effecting the considerable savings.

Their proposal followed a visit to the plant by a DCSC value engineer detailing the advantages to contractors of the Value Engineering Change Proposal program.

**RACK 'N' STACK**—Donald R. Hutton, forklift operator at Defense Depot Tracy, Calif., demonstrates how one man can stack bulky material using a rack he devised.

By welding two upright pipes to the remains of a salvaged mobile trump ramp, Hutton has made it possible for one operator to be able to handle large metal sheets and pipes. Previously, this type of stacking was done manually and required two men plus a forklift operator. The forklift operator lowers the material, backs his forklift away from the stand and the two uprights retain the load. The idea, which earned him a \$25 Suggestion Award, has saved this California installation more than \$575. The Depot is a field activity of the Defense Supply Agency.



One of the greatest potentialities for making complex government manageable is to depend more heavily upon States and cities for those actions which they can best perform. I would urge that more Federal assistance be directed towards helping local governments strengthen their own ability to plan and manage community affairs. The guidelines we provide are often far too detailed and the checkpoints too numerous. At the same time, in the past many categorical grants have by-passed the political leadership in the community. As the role of Federal Government in local affairs has expanded, the city council and the mayor often have been left with little to say about major projects with great impact on their communities. The same can be said about the governor with respect to the State government. The Federal Government should do all it can to strengthen State government, so that the States will be prepared to carry out many activities which the Federal Government is trying to carry out now.

#### **5. Simplify Procedures—Cut Red Tape.**

The Bureau will place far more emphasis on simplifying procedures, particularly those involving more than one program. For example, we hope to help agencies redesign the present morass of administrative processes concerning State and local grant programs. Without strong determination and control, procedures multiply at an alarming rate and do not get simplified.

Most people in a large organization control such a small piece of the total process that they cannot begin to realize the over-all problem of inefficiency. Each person tends to conceive of his own little piece as the whole, which results in considerable overlap where the pieces meet. Many procedural requirements are really not essential to carrying out a program effectively. They result in time lags, frustration, and not meeting problems when they are in the greatest need of solution. Surprisingly, even such a common industrial engineering technique as flow charting is seldom used to show the interrelationship of the vast variety of steps involved in the life cycle of government projects, particularly those involving several agencies and perhaps several levels of government. The result of the void is unrealistic scheduling, confusion, and unkept promises.

While some red tape is no doubt rooted in legislative requirements, much of it is self-imposed by the departments and agencies. With forceful direction from top-side in the departments and agencies, and with support and help from the Bureau of the Budget, government procedures in many areas can be greatly streamlined without legislative changes.

Legislation is also needed. We have already appeared before Congress in support of joint funding simplification. Further, we have advised Congress of our intent to forward proposals for an even more basic attack on this problem through consolidation of grants in related areas.

#### **6. Develop Better-Prepared Managers and Use Them.**

More capable management talent needs to be obtained and developed in the Federal Government and placed in positions where it will be used in helping to reach Government objectives. While new and better talent needs to be developed, there is already available much management talent that is not being used to best advantage.

One managerial development technique which has not been used enough in the Government is the rotation of personnel among programs, agencies, and kinds of work. Too many professionals and managers have worked only in one department or agency and in only one program or occupational area. Inbreeding within a unit stifles innovation over a span of time. Such groups become islands of parochial isolation without perspective and are preoccupied with tradition and survival. Deliberate schemes of rotational assignment between and among agencies, levels of government, and headquarters and field would help to provide the breadth of skills and experience needed in modern complex government. More rotation would build in less dedication to time-worn concepts and methods and more freshness, open-mindedness, and imagination.

### **THE CHALLENGE**

During the next few years, the emphasis will be on better management. We will need to find more effective ways of organizing and managing complex governmental programs that cross department and agency lines, that require the participation of other levels of government, and that demand the cooperation of private institutions. This will be a joint venture involving all of these elements.

The Bureau of the Budget can make its contribution by actively participating in improvement efforts, by assembling diverse interests and skills, by encouraging and leading, by filling gaps that are not being worked on by others, and by monitoring the application of solutions determined by this process.

The purposeful change brought about during the last twenty years by imaginative ideas and the weight of resources is small compared to what management can do in the next few years. Management, now, has the challenge! □



Deputy Secretary of Defense David Packard recently established a Joint Logistics Review Board (JLRB) to review worldwide logistics support to combat forces during the Vietnam era, to identify strengths and weaknesses and make appropriate recommendations for improvement.

The Board, headed by Gen. Frank S. Besson, Jr., USA, Commanding General of the Army Materiel Command, will submit its findings and recommendations directly to the Secretary of Defense and the Chairman of the Joint Chiefs of Staff by March 1, 1970. It will be dissolved upon completion of the final report, or as otherwise determined by the Secretary of Defense.

In addition to General Besson, the Board consists of a senior general or flag officer representing each military service, DSA, and appropriate representation from the Joint Staff of the Joint Chiefs of Staff. The board will be augmented with a staff furnished by the military services.

#### *Service Representatives*

Board members assigned, in addition to General Besson and Admiral Bottoms are: Maj. Gen. Oren E. Hurlburt, USA, who has been nominated by President Nixon for appointment to the grade of Lieutenant General; Vice Admiral designee Edwin B. Hooper, U.S. Navy representative; Lt. Gen. Lewis L. Mundell, U.S. Air Force representative; Lt. Gen. Frederick L.

Wieseman, U.S. Marine Corps representative; RADM John W. Bottoms, SC, USN, as DSA representative; Col. H. T. Casey, USA, and Col. John W. Hanley, USAF, have been named as representatives of the Joint Staff.

JLRB has been authorized to deal directly with components of the military departments, Defense agencies concerned and with the unified and specified commands to obtain necessary information.

#### *Advisory Committee*

To assist the members, a Logistics Review Advisory Committee has been established, headed by the Deputy Secretary of Defense or his designee, with the following members: Assistant Secretary of Defense (Administration); Assistant Secretary of Defense (Comptroller); Assistant Secretary of Defense (Installation & Logistics); Assistant Secretary of Defense (Systems Analysis); Secretaries for Installations and Logistics of the military departments; Deputy Chief of Staff for Logistics USA; Deputy Chief of Naval Operations (Logistics); Deputy Chief of Staff, Systems and Logistics, USAF; Assistant Chief of Staff G-4 USMC; Director of Logistics, Joint Staff; Special Assistant for Strategic Mobility, Joint Staff; Director, Defense Supply Agency; Commanders of the Army Materiel Command, Naval Materiel Command, Air Force Logistics Command and Air Force Systems Command.

### AMC RECEIVES AWARD

Gen. Bruce Palmer, Jr., Vice Chief of Staff, U.S. Army recently presented a Department of the Army Cost Reduction Program Certificate of Distinction to Gen. Frank S. Besson, Jr., Commanding General, U.S. Army Materiel Command. The Army Materiel Command was recognized for its outstanding contributions to the Program during Fiscal Years 1963-68. Since the inception of the Program, the Army Materiel Command has annually reached or exceeded its assigned Cost Reduction goals.

### SMART COOKERY

Because they used an inverter instead of a converter, maintenance personnel at Norton AFB, Calif., saved \$8,600.

The converter was ordered for a C-118, to change the aircraft's power to 115-volt, 60-cycle for cooking. While awaiting receipt of the ordered item, an inverter was used to change power to 115-volt, 400-cycle.

This method cooked the food faster and required less maintenance. As a result, the supply order for the converter was canceled.

### COOL IT



Packers Antonio Nazario (left) and Peter Ramirez at Defense Depot, Tracy, Calif., pack a thermal container using a 2-pound refrigerant. Testing by Quality Control Branch personnel indicated that a 2-pound package, not exceeding 7½ inches x 4 inches x 2¼ inches, was more suitable for this purpose than the 1.5-pound package currently in use, and cost \$1.09 less per case. The depot, which uses about 12,000 cases annually, expects to realize a savings of almost \$14,000 each year. The depot is a field activity of the Defense Supply Agency.

THE SECRETARY OF DEFENSE  
WASHINGTON

March 24, 1969

MEMORANDUM FOR THE ASSISTANT SECRETARY OF  
DEFENSE (*Installations and Logistics*)  
SUBJECT: Improving the Efficiency of Logistics Management

Recently President Nixon stated, "It is absolutely essential that the most effective use be made of all the country's resources in achieving the Nation's goals and that governmental functions be accomplished with the least possible waste."

In response to this challenge, I approved cost reduction goals of over one billion dollars for the current fiscal year. The Cost Reduction Program is an effective tool for motivating individuals within the Department of Defense and measuring their performance. It does not, however, enable us to measure and evaluate the total management effort being applied to key logistics programs, functions and activities.

My reason for selecting the logistics areas for special attention is because they consume over one-half of the Defense budget. Therefore, any improvement in the efficiency of logistics management should have a positive effect on the cost and effectiveness of the Armed Forces and result in over-all improvement in our combat readiness.

I understand that recently your office has been evaluating a new management improvement procedure designed to establish objectives and measure performance for a few carefully selected logistics areas. The experience gained from this effort confirms the feasibility of developing and initiating the kind of system I have in mind.

Accordingly, we should start immediately to develop an ability to establish realistic objectives, measure progress, evaluate results, and take prompt corrective action when necessary. Such a capability must be viable, dynamic and timely. In other words, this would be a program in which the areas under review would change with priority and as we were all assured that these various areas were being soundly managed. I am suggesting that this program initially should encompass about 20-30 selected areas, which would be carefully evaluated both at OSD and subordinate echelons. The new program will be identified as the Logistics Performance Measurement and Evaluation System.

The opportunities which lie ahead in this effort justify proceeding with a sense of urgency and priority and warrant the full support of senior officials within OSD and at Departmental and Defense agency levels. I can assure you that it will receive my personal attention during the coming months.

DAVID PACKARD,  
Deputy.



IMPROVED MANAGEMENT FOR DEFENSE LOGISTICS - WASHINGTON,

MAY 8--

DEPUTY SECRETARY OF DEFENSE DAVID PACKARD AND ASSISTANT SECRETARY OF DEFENSE BARRY SHILLITO MET TODAY WITH BUREAU OF THE BUDGET DIRECTOR ROBERT MAYO AND ASSISTANT BOB DIRECTOR DWIGHT INK TO DISCUSS A NEW SYSTEM FOR IMPROVING MANAGEMENT OF THE DEFENSE DEPARTMENT'S MULTI-BILLION DOLLAR LOGISTICS OPERATIONS. HARRELL ALTIZER, DIRECTOR OF COST REDUCTION AND MANAGEMENT IMPROVEMENT PROGRAMS IN THE OFFICE OF THE SECRETARY OF DEFENSE, BRIEFED THESE OFFICIALS ON THE RECENTLY INSTITUTED SYSTEM, CALLED THE LOGISTICS PERFORMANCE MEASUREMENT AND EVALUATION SYSTEM.

MR. ALTIZER SAID THAT THE SYSTEM IS DESIGNED TO SPOTLIGHT CRITICAL PROBLEM AREAS AMONG THE THOUSANDS OF PROCUREMENT AND DISTRIBUTION FUNCTIONS OF THE DEPARTMENT OF DEFENSE. HE POINTED OUT THAT BY DEVELOPING CLEARCUT GOALS FOR EACH AREA SELECTED, APPLYING SPECIFIC MEASUREMENTS OF PROGRESS, AND OBTAINING REASONS FOR LESS-THAN-EXPECTED PERFORMANCE, ANALYSTS COULD THEN HAVE FIRM BASIS FOR RECOMMENDING IMPROVEMENTS. HE SAID THAT 21 LOGISTICS AREA WILL HAVE BEEN IDENTIFIED AND EVALUATED UNDER THIS SYSTEM BY THE END OF THE CURRENT FISCAL YEAR.

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